

10. Pull Scenario Group

The objective of the Pull Scenario Group is to confirm that science users and investigators are provided with the ECS services necessary to search, access, and view the data holdings of both the ECS and Version 0 (V0) portions of the DAACs and ADCs/ODCs. ECS Pull Group services includes: user login, user authentication, browses, search types, file transfer protocol (ftp) orders, media access, support for standing orders, interoperability with the Version 0 system and ADCs/ODCs, and interfaces to other facilities. Figure 10-1 illustrates the scenarios associated with the Pull Scenario Group.

The ECS Science Office conducted detailed discussions with the Earth Science community in order to develop representative science scenarios that illustrate how the science community utilizes ECS. These Science User Scenarios are used as a basis for the test descriptions included in this Pull Scenario Group. These baseline scenarios are tailored, where necessary, to reflect the services and data available at Release B. The scenarios used here are shown in Table 10-1, and covers data at all DAACs and at least one data product from each EOS instrument.

Table 10-1. Different Science User Scenario For Each DAAC with their Instruments

DAAC	Science Title	Scenario Author	Instruments	Notes
ASF	GCM Researcher Mid-Latitude and Tropical Interactions-Precipitation Forcing	Jim Stobie	ERS, JERS, RADARSAT	Sea ice and polar processes imagery
EDC	Global Carbon Modeling Study of Biomass Burning	Chris Justice	Landsat7, ASTER, MODIS	Land processes imagery
GSFC	Sugarland Run Regional Park watershed	Jerry Garegani	VIRS, COLOR, MODIS	Upper atmosphere, atmospheric dynamics, global biosphere, and geophysics
JPL	Southern Ocean Large Scale Circulation	Leonard Walstad	SeaWinds, DFA, MR	Ocean circulation and air-sea interactions
LaRC	Review Paper about the Earth Radiation Budget (ERB)	Bruce Barkstorm Collected by Haldun Direskeneli and Written by Tess Wingo	CERES (TRMM), CERES (AM-1) SAGE III, ACRIM, MOPITT, MISR	Radiation budget, aerosols, and tropospheric chemistry
MSFC	Daily Access of Lightning Data	Dr. Raul Lopez	LIS, PR, TMI	Hydrology
NSIDC	NSIDC Science Scenario Sea Ice	Dr. John Heinrichs	MODIS	Cryosphere (non-SAR)
ORNL	PSU, Earth System Science Center Global Circulation Modeling-Global Water Cycle	Dr. Eric Barron	N/A	Biogeochemical dynamics

Note: Science Scenarios collected and written by ECS Science Office Staff

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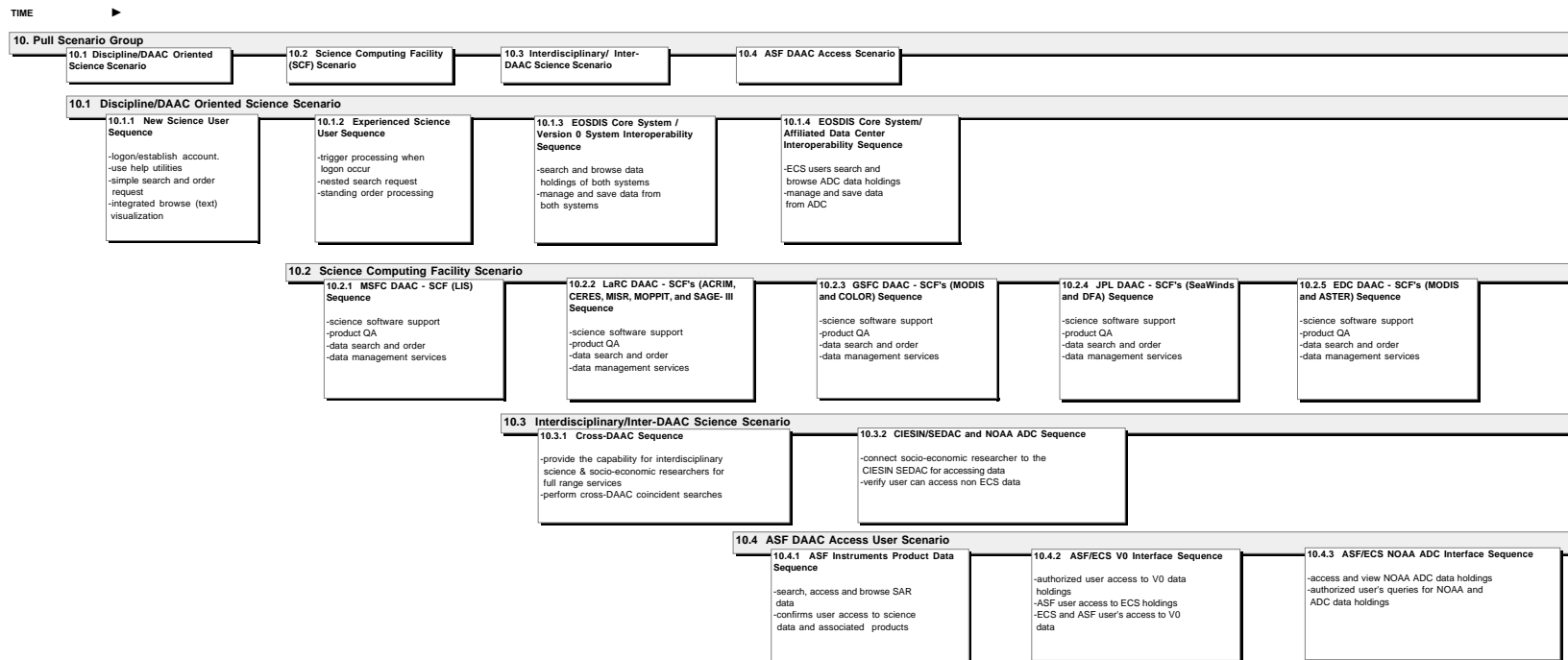


FIGURE 10-1. Pull Scenario Group Acceptance Test Sequencing

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10.1 Discipline/DAAC Oriented Science Scenario

This scenario verifies that ECS provides the capability for new and experienced ECS science users to perform searching, accessing, and viewing stored data at a Version 0 (V0) DAAC and ECS. For each DAAC that the Acceptance test team visits, the emphasis is placed on access to science products related to that DAAC's primary area(s) of science data holdings. For each DAAC, a different science scenario(s), as collected by the ECS Science Office, forms the basis for testing pull functionality. The scenario(s) exercise the same functionality at each DAAC, but use the data products archived at that particular DAAC, in addition to the data from the corresponding Version 0 DAAC. The following paragraphs describe the Discipline/DAAC Oriented Science Scenario in greater detail.

This scenario demonstrates the capability to provide a new ECS science user with efficient access to ECS services, while making use of the help utilities, such as on-line guide, to explore the system services. Access is established to confirm that the new science user accesses the full range of services.

For an experienced ECS science user who is thoroughly familiar with the system and has already registered with ECS, this scenario verifies that ECS provides ready access to the following services: information search, user feedback information, ECS client operations information, and applications programming interfaces (APIs). For both new and experienced users, access to data and products archived at the DAAC is confirmed.

The capability for an authorized ECS user to search, access, and view data holdings archived in the V0 portion of the DAAC is confirmed. The ECS user identifies the V0 data of interest using the ECS Advertising Service, which provides search and order services for accessing V0 data holdings.

Also, this scenario confirms that an ECS science user has the ability to search, access, and view pertinent NOAA ADC data holdings. Accessing these data holdings verifies the ECS user's ordering of data products, algorithm packages, and documents; initiation of standing orders; and requesting status for previous orders.

10.1.1 New Science User Sequence

This sequence confirms that a new science user is provided with efficient access via Direct connection, Dial-up connection and Network link to ECS and non-ECS network attached facility services. A user accesses the help utilities such as on-line guide to explore the various system services such as: requests and results for inventory data, guide and browse searches; receive user authentication request; product request; product generation request and product delivery status information.

The test process involves the following: initial processing of a new science user access setup; generating of simple search queries using a number of methods to access high-level and detailed data product information; locating and retrieving data products in preparation for ordering; submitting data product request orders; receiving data order results; visualizing pre-order data products; accessing LIM/DIM capabilities; and requesting the current status of account balance.

Access to each DAAC is established to confirm that the new science user has access to the full range of services, spanning the entire data holdings of EOSDIS for Release B.

Initial processing of the new user setup involves user log-on, completion of an ECS account application, and activation and update of the user profile for account privileges.

Generation of simple search queries and locating available mission and instrument data products information involves the user accessing the following services: the Directory, providing the user with information on DAAC datasets from any point in the system; the Guide, providing the user with detailed descriptions about data products, platforms, and data centers; the Inventory, providing the user with the specific observations that are available for a data archive; and the Browse capability, allowing the user to view the image at reduced resolutions. Once the user has located and selected the product of interest, the user is ready to place a product order. The type of distribution is specified in the order.

For this sequence, the Science Scenario Model #11b shown in Figure 10-2 ("Derivation of Snow Water Equivalents," described by John Walsh) collected by Kaminski/Khalsa and written by Tess Wingo of the ECS Science Office, forms the basis for the test cases.

<p style="text-align: center;"><u>Derivation of Snow Water Equivalents</u> <u>Subject: John Walsh</u> <u>Collectors: Khalsa/Kaminski</u> <u>Written By: Tess Wingo x0814</u> <u>Scenario #11b (old #21)</u></p> <p>Purpose and Duration of the investigation: -The purpose of the investigation will be to research snow water equivalents. The data gathering will last for 1 week and the analysis for the investigation will last 1 year (51 weeks of analysis). The work is being completed by a primary research scientist and his staff of research assistants. -All work in this scenario is done interactive to the screen, except for an initial phone call to the help desk.</p> <ol style="list-style-type: none">1) Researcher <i>Searches</i> Directory for high level datasets information for brightness and snow for research into snow water equivalents. (@1 request, @ small <25 hits returned for the request)2) <i>Inspects</i> the Directory for high level dataset information for brightness and snow for research into snow water equivalents. (@1 request, @small <25 hits returned for the request)3) After phoning the help desk the researcher is informed that there are currently no EOS instruments that will produce the same information. The help desk directs them to the SSM/I gridded brightness temperature data, and tells them about the Canadian Climate Center Snow Water Equivalent(SWE) algorithm, which they can use with the SSM/I data to derive snow water equivalents. So, the researcher does a <i>Search</i> on the Guide to get the information on SSM/I (Special Sensor Microwave/Imagery), gridded brightness temperature data sets, working with a 5 year period North of 30 degrees N. (The Science Data Plan says that in 1995 this product has 12.26GB/year, but this may change by year) (@1 request, @ small <25 hits returned for the request)4) <i>Inspects</i> the Guide in order to look at SSM/I gridded brightness temperature data to eventually derive snow water equivalents with the help of an algorithm. (@1 request, @ small <25 hits returned for the request)5) After conferring with Dr. Walsh about their findings and confirming his research needs the staff submits inventory searches for the data sets they are interested in. (@1 request, @ Medium 25-75 hits returned for the request)
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Figure 10-2. Science Scenario 11b "Derivation of Snow Water Equivalents"
(1 of 2)

Derivation of Snow Water Equivalents

Subject: John Walsh

Collectors: Khalsa/Kaminski

Written By: Tess Wingo x0814

Scenario #11b (old #21)

6) This is the same type of step as (step 5) however the search has a greater complexity. The researcher wants the *search* to filter the resultslist from the inventory to retain only evry third day. (@1 request, @ medium 25-75 hits returned for the request)

7) Researcher wants to *inspect* the **inventory** from the (second - refined) search on this dataset. (@1 request, @ small <25 hits returned for the request)

8) The help desk has told them about the Canadian Climate Center's Snow Water Equivalent (SWE) algorithm which they can use with the SSM/I data to derive snow water Equivalents. So they *Search* the **Algorithm package** for the above information. (@1 request, @ small <25 hits returned for the request)

9) They want to order the full algorithm package for the Canadian Climate Center's Snow Water Equivalent (SWE) algorithm, so they do an *exchange* from the **Algorithm package** layer. (@ 1 request, @ small <25 hits for the request) via ftp.

10) After having refined the search and inspected the data they order the data (or *Exchange* **Level 3** SSM/I gridded brightness temperature data, North of 30 degrees N, 120 days/yr * 5 years, at 600 granules (1 grid/granule)) (600 grids * 608 * 896 pixels/grid * 16 bpp = 653 MB) (@1 request, @ large >75 hits for the request) via ftp.

****Services are in italics*

*****Pyramid layers are in BOLD**

**Figure 10-2. Science Scenario #11b "Derivation of Snow Water Equivalents"
(2 of 2)**

10.1.1.1 Test Case B100110.010-System Access via Network Connection

The System Access via Network Connection test case verifies that ECS is accessible via network link. The Demonstration, Test and Inspection methods are used to verify that each DAAC is accessible by remote network connection. The user accesses the DAAC by network link. Once the user has accessed the system, the system launches a login window, prompting the user for their login name or ID and password. After logging-in, a status message describing current status of ECS services is displayed. The user has the ability to launch an on-line help tool at this time. The predicted time when services resume is listed along with any services described as temporarily unavailable.

10.1.1.2 Test Case B100110.020-System Access via WAIS and WWW

The System Access via WAIS and WWW test case verifies that ECS is accessible via WAIS and WWW. The Demonstration and Inspection methods are used to verify that ECS is accessible to the user. The user gains access through a Universal Resource Locator (URL) and uses one of the following as a browser: Mosaic, Netscape or WinWeb.

Once the user has accessed the system, the system launches a log-in window, prompting the user for their log-in name or ID and password. After logging-in, a status message describing current availability status of ECS services is displayed. The user launches an on-line help tool at this time. The predicted time of when services resume is listed along with any services described as temporarily unavailable.

10.1.1.3 Test Case B100110.030-System Access to ECS Client

The System Access to ECS Client test case verifies that ECS is accessible via direct connection (the client is local to the user's workstation). The Demonstration and Inspection methods are used to verify direct connection accessibility. The user uses a telnet address for a specific DAAC to establish the connection.

Once the user has accessed the system, the system launches a log-in window, prompting the user for their log-in name or ID and password. After logging-in a status message describing current availability status of ECS services is displayed. The user launches an on-line help tool at this time. The predicted time when services resume is listed along with any services described as temporarily unavailable.

NOTE: For the remainder of this sequence, the user is accessing the system via network connection.

10.1.1.4 Test Case B100110.040-User Registration

The User Registration test case verifies requirements that relate to the user registration process for a new science user. The Test and Inspection methods are used to verify that ECS requests registration approval, user account priorities, and authorized user services from the System Management Center (SMC).

The registration process consists of downloading the set of standard client software from a publicly accessible system distribution point. This includes a variety of software for accessing system services and managing the user's desktop environment. A variety of access mechanisms are supported, including, but not limited to WWW HTTP servers, anonymous FTP servers, and hard media (e.g. CD-ROM) distribution via US mail.

After the registration process is complete, the system responds by displaying a list of services that are available to the user. In addition to providing a list of available services, the system provides users with descriptive information about ECS and the types of data it contains.

10.1.1.5 Test Case B100110.050-User Profile

The User Profile test case verifies that ECS provides the new science user with the capability to customize and configure the ECS client to the specifications that are most conducive to the user's research interest. The Test, Inspection and Demonstration methods verify that ECS provides the users with the capability to define and modify their user profile information. Depending on the user's display device capabilities, the user has access to a number of features (e.g.; multiple window display, buttons and pull down menus, context sensitive help, etc.).

This test case verifies that the user sets and modifies their profile through a set of screens. The user has the capability to adjust the behavior of the client's user interface, as well as to expand on information needed to utilize specific ECS services (e.g. data search). The ECS services includes preferences such as date, time, latitude, and longitude formats, user mailing address, search parameter defaults, default application/services to invoke data browsing, and expertise level: (i.e., novice, intermediate, or expert). The registration process also assists the user in selecting the best DAAC for their research interest.

10.1.1.6 Test Case B100110.060-Directory

The Directory test case verifies that ECS has the capability to provide the user with a collection of uniform descriptions that summarize the contents of a large number of data sets. The ECS users have access to directories that describe Earth Science Disciplines data sets, whole EOSDIS data sets, non-EOSDIS data sets, and ADC Earth Science data sets. The information provided assists the user in determining the existence and contents of the data sets.

The Science User Scenario entitled "Derivation of Snow Water Equivalents" (Figure 10-2) collected by Kaminski/Khalsa and written by Tess Wingo of the ECS Science Office is referenced in order to demonstrate and test this service. After corresponding with the ECS help desk, the user is directed, by the help desk, to the SSM/I gridded brightness temperature data. The Demonstration method is used to verify the user's ability to query the directory of SSM/I gridded brightness temperature data using "SSM/I" as the keyword for the search criteria.

The expected result from the system is an informational message response stating the query is being executed. A listing of the directory information that relates to the requests is then displayed on the user's screen.

10.1.1.7 Test Case B100110.070-Guide

The Guide test case verifies that ECS provides the user with a document detailing data sets and related entities. The information provided in the descriptions assist the user in determining the nature of each data set and its potential usefulness for a specific application. The on-line guide provides references, such as documentation of processing algorithms used for EOS and other EARTH Science data products generated by the ECS, results of science data quality assessments of EOS data; bibliography of published and unpublished literature (as available) derived from the project; and other specifications, summaries, options and cross references as required. The Science User Scenario entitled "Derivation of Snow Water Equivalents" (Figure 10-2) is referenced to demonstrate and test this service.

The Demonstration method is used to verify the ECS provides the user with on-line guide (documentation/reference material) which contains information about individual EOSDIS data sets. This functionality is tested by searching for the availability of data set guide information and data product names for products associated with SSM/I gridded brightness temperature.

The user specifies the following parameters to locate the guide information: 5 year period (1987 - 1991 North of 30 degrees N), and "SSM/I" as the keyword. The system then responds to the user with an informational message stating that the query is being executed. Once the system has executed the request, a listing of <25 hits of guide information that relates to the requests is displayed.

10.1.1.8 Test Case B100110.080-Inventory

The Inventory test case verifies that ECS provides the user with information describing each granule of EOSDIS data. The primary use of this service is to view local, regional or global product searches, return enough information to identify specific granules and allow further investigation (such as requests for browse products, production history, QA statistics), or to determine that the granules are suitable for access.

The Demonstration and Analysis methods are used to verify the ECS provides the ability to search the data inventory that describes each granule of EOSDIS data. This test case verifies that ECS provides interactive support including extensive prompting and help utilities while executing this query. The Science User Scenario entitled "Derivation of Snow Water Equivalents" (Figure 10-2) is referenced to demonstrate and test this service.

Using the "SSM/I" as the keyword for the search criteria, the user queries the inventory for data sets. The system responds with an informational message stating that the query is being executed. Once the system has executed the request, a listing of 25 - 75 hits for inventory information is displayed.

10.1.1.9 Test Case B100110.090-Browse

The Browse test case verifies that ECS allows the user to pre-screen individual products before ordering the product. This test case also verifies that the user has the ability to perform correlative viewing of multiple sources to aid in the selection of product order. The Demonstration method is used to verify the user's ability to visualize pre-order data products and metadata (e.g., coverage maps, summary data) to facilitate the data selection and ordering process. The Science User Scenario entitled "Derivation of Snow Water Equivalents" (Figure 10-2) is referenced to demonstrate and test this service.

The user submits a query for Level 3 SSM/I gridded brightness temperature browse data for the northern hemisphere to locate the data sets (see the scenario in Figure 10-2). Once the user has selected the results of the request, the user has the option to browse the Level 3 SSM/I gridded brightness temperature data.

10.1.1.1 Test Case B100110.100-Data Product Order

The Data Product Order test case verifies that the distribution criteria for each data product and data product software is accessible by ECS. This test case also verifies that ECS has the ability to compare the distribution criteria to the requester's data access rights in order to verify the data and software are distributed as requested.

The Test and Demonstration methods are used to verify that ECS has the ability to distribute information on-line (i.e., over a network) and off-line (i.e., hard copy). The Demonstration method also verifies that ECS has the capability to accept orders from users for periodic delivery of information stored in ECS. The Science User Scenario entitled "Derivation of Snow Water Equivalents" (Figure 10-2) is referenced to demonstrate and test this service.

The user submits an order for Level 3 SSM/I gridded brightness temperature data for the northern hemisphere (see Scenario in Figure 10-2) via ftp. After the user orders the data product, the system responds with an acknowledgment of the request, the estimated time for the data transfer, and the amount of data expected as the result of the product order. The user is then notified of the data arrival with a message via e-mail.

The data order steps are then repeated for different types of media and to verify distribution capabilities for all required media as required to complete testing.

10.1.1.11 Test Case B100110.110-Account Balance

The Account Balance test case verifies that ECS receives and distributes an account balance request. The Test method is used to verify that ECS has ability to receive a user's request for the current status of their account balance and product cost information. This test case also verifies that Mission Management Office (MMO) has capability to send the product cost information and ECS sends the user the requested information.

The user submits a request for their account balance. After the user submits the request, the system responds with an informational message stating that the request is being executed. Once the system has executed the request, the user's current status and account balance is displayed.

10.1.2 Experienced Science User Sequence

The Experienced Science User sequence addresses science users who are thoroughly familiar with the system. The science users may be located at an SCF or may be local to the DAAC. This sequence differs from the "New User Sequence" in that the focus is on demonstrating the capabilities of the ECS system to a user who is already familiar with the system. For example, at the MSFC DAAC, the Science Scenario Model #15 as shown in Figure 10-3 (Daily Access of Lightning Data) written by Dr. Raul Lopez forms the basis for the test cases. Using this Science Scenario, the user must specify the LIS (Lightning Imaging Sensor) and Continental United States & Coastal Areas as Search criteria and then query the guide for Event Data, Observation Time and Single Events. The user requests the product history of the data used to produce the contour plots. The user is able to visualize the various contour plots as a movie loop. Also, the user orders LIS Data for a given time span.

This sequence verifies requirements related to the following services:

Information Search -- searching across multiple data sets for coincident occurrences of data in space or time; identifying product information that dynamically browse the data and metadata holdings by new search methods; data product ordering, standing and retrospective product orders on various types of high density media such as CD ROM, 8mm tape, 4mm DAT, 6250 tape, and 3480/3490 tape.

User Feedback Information -- assessment of product data quality and schedule performance; status of product data; cancellation for product data order requests; construction and submission of standing orders and product orders; notification of data that has been processed or reprocessed to user community; cost information from ECS about Landsat-7 data product; production of reports that correlate science data; and the evaluation of quality of ECS services.

ECS Client Operations Information -- system utilization of the ECS; outstanding data distribution requests; outstanding data processing requests; history of ECS resources; data base administration; backlog information; subset, subsample and average data products; format conversion, compression and data transformation; CPU utilization; and Applications Programming Interfaces (APIs) and infrastructure for user extensions.

Two Science scenarios are used during this sequence to demonstrate information search and order capabilities. These scenarios: Daily Access of Lightning Data (Science Scenario #15) Figure 10-3, and Grassland Scenario (Science Scenario #3) Figure 10-4 will be further expanded on during development of the Acceptance Test Procedures.

Daily Access of Lightning Data
Dr. Raul Lopez

1. Dr. Lopez logs on for the first time and enters "LIS" and "Continental United States and coastal areas" as search criteria for Guide information. He is hoping to find descriptions at the parameter level, so he knows which parameters will be useful to him. The system returns a list of matching items.
2. He then selects each item and reads the descriptions. He decides that his parameters of interest are: Event Data (param #4363, prod. #LIS02, Level 1B), Observation Time (param. #4365, prod. #LIS02, Level 1B), and Single Events (param. #4368, prod. #LIS02, Level 1B), and Single Events (browse) (param. #4372, prod. #LIS02, Level 1B).
3. He orders all of the Guide information for all of the LIS parameters (24 of them), for reference purposes. He specifies that he would like to receive it via ftp overnight.

Figure 10-3. Science Scenario 15 "Daily Access of Lightning Data" (1 of 5)

Daily Access of Lightning Data
Dr. Raul Lopez

4. Dr. Lopez then would like to know if there are any algorithms available that will take the Single Events parameter and from it, produce a contour plot (units of number of flashes/km²) for the United States and its coastal areas. He enters "contour plot" and "algorithms" as search criteria. The system returns a list of available algorithm packages that will produce a contour plot.
5. He selects the items one at a time and reads the information regarding what inputs are required, etc. He determines that one of them will suit his purposes.
6. Dr. Lopez orders the information describing the algorithm he intends to use.
7. Dr. Lopez then instructs the system to produce a contour plot of the Single Event Data (using his chosen algorithm), overlay the contours on a map of the continental U.S., and send this to the screen for his inspection. He studies the contour plot and sees areas of heavy activity in central and southern Florida and in southern Arizona.
8. He draws a polygon enclosing the closely-spaced contours in Florida. He then requests that the system "zoom in" on the enclosed area, but the new display should show the actual full-resolution Single Events (by plotting a "o" or a "+" for each event at the lat/long at which it was detected) overlaid on top of a "zoomed" map of the enclosed area of Florida.
9. While in this "zoomed" display, he would like to see the same data for the 12 hours preceding the current (most recent) map by viewing it as a "movie loop". He would like four modes of movie loop - continuous forward from first frame to last; step forward frame-by-frame, step backward frame-by-frame, and oscillating (forward from first frame to last and then backward from last frame to first in a continuous mode) In this step, he would like to view the movie loop in continuous forward mode. He determines the lightning activity began about 4 hours before the current (most recent) map. He also determines that the lightning activity is still fairly heavy.

Figure 10-3. Science Scenario #15 "Daily Access of Lightning Data" (2 of 5)

Daily Access of Lightning Data
Dr. Raul Lopez

10. Still in the "zoomed" display, Dr. Lopez submits an order for his parameters of interest (there are 4) for the time range of $t - 4 \text{ hrs} < t < t + 8 \text{ hrs.}$, where t is the time of the current (most recent) map.
NOTE: this will cause an "immediate" order for data already available (the previous 4 hrs), as well as a "standing" order for the next 8 hrs of data as it becomes available.
11. Dr. Lopez "zooms out" to the contour plot.
12. Dr. Lopez draws a new polygon enclosing the activity in Arizona. He then requests that the system "zoom in" on the enclosed area, but the new display should show the actual full-resolution Single Events (by plotting a "o" or a "+" for each event at the lat/long at which it was detected) overlaid on top of a "zoomed" map of the enclosed area of Arizona.
13. While in this "zoomed" display, he would like to see the same data for the 12 hours preceding the current (most recent) map by viewing it as a "movie loop". In this step, he would like to view the movie loop in continuous forward mode. He determines the lightning activity began about 2 hours before the current (most recent) map. Based on his many years of experience, he determines that the lightning activity is still increasing.
14. Still in the "zoomed" display, Dr. Lopez submits an order for his parameters of interest (there are 4) for the time range of $t - 2 \text{ hrs} < t < t + 4 \text{ hrs.}$, where t is the time of the current (most recent) map.
NOTE: this will cause an "immediate" order for data already available (the previous 2 hrs), as well as a "standing" order for the next 4 hrs of data as it becomes available.
15. He zooms out to the contour plot.
16. Dr. Lopez requests that the system display a file (user profile?) that he can edit. He would like to set up his account in such a way that when he logs on every day, the contour plot is automatically generated and the Single Event data is also available when he "zooms in". Then he logs off.
17. The next day, Dr. Lopez logs onto EOSDIS and his contour plot appears after a slight delay. However, the plot contains no contours. An "empty" contour plot is unexpected.

Figure 10-3. Science Scenario #15 "Daily Access of Lightning Data" (3 of 5)

Daily Access of Lightning Data

Dr. Raul Lopez

18. Dr. Lopez requests that the system display the Product History for the product from which the contour plot is generated (the "Single Events" parameter).
19. Dr. Lopez searches for lightning data from the National Lightning Detection Network (NLDN) using "NLDN", lightning, and U.S." as search criteria. A list is displayed.
20. He selects the item corresponding to the time when the Product History from step #18 said there was a problem with the "Single Events" generation. He expects to see a map of the U.S. with the ground strike locations plotted as "o" or "+".
21. He sees lightning activity in Florida, draws a polygon, and zooms in.
22. He requests that the system display the data as a movie loop (continuous forward mode) from the past six hours to the present, if possible.
23. While in this display, Dr. Lopez orders the NLDN data for the zoomed area for a time span:
 $t - 3 \text{ hrs} < t < t + 3 \text{ hrs}$, where t is the current time.
NOTE: this will cause an "immediate" order for data already available (the previous 3 hrs), as well as a "standing" order for the next 3 hrs of data as it becomes available. Then he logs off.
24. The next day, Dr. Lopez logs onto EOSDIS and his contour plot appears after a slight delay. He sees there is very high lightning activity in the Gulf of Mexico area, extending across southeastern Texas, southern Mississippi, and southern Alabama.
25. He draws a polygon and zooms in on the enclosed area to inspect the LIS Single Events.
26. While inspecting the zoomed display, he requests a 12 hour movie loop (continuous forward mode) of the data, ending with the current time.
27. He sees that his chosen area is not large enough to capture everything of interest to him, so he zooms out to the contour plot.
28. He then draws a new polygon which includes all of Texas, Mississippi, Alabama, Oklahoma, Arkansas, Tennessee, North Carolina, South Carolina, Georgia, and Florida. He zooms in on the new area.

Figure 10-3. Science Scenario #15 "Daily Access of Lightning Data" (4 of 5)

Daily Access of Lightning Data
Dr. Raul Lopez

29. While in the zoomed display, he requests a 12 hour movie loop (continuous forward mode) of the data, ending with the current time.
30. He then requests that the NOAA radar network data for the corresponding times and for his chosen area (as close to the times as possible) be displayed in a window next to the LIS Single Event data.
31. He then selects both of the windows and steps forward through the movie loop (both the radar data and the LIS data displays advance to the next image in the loop). If a window is not selected, it will not be acted upon by the next command. Thus, if a window is not selected before viewing a movie loop, it will continue to display the first frame of the loop while the selected ones will step through the loop.
32. While still in the zoomed display, he then requests coincident (as closely coincident as possible) data from the NLDN be displayed in a third window, such that he can see all three displays side-by-side, or two at the top of the screen, one at the bottom, etc. (the important thing is that they don't overlap). The base map for the three data sets should be as similar as possible.
33. While still in the zoomed display, he views a 12-hour movie loop of these three data sets in continuous forward mode. All three data set displays advance simultaneously (or as close to simultaneously as possible).
34. While still in the zoomed display, he views a 12-hour movie loop of these three data sets in step forward mode. All three data set displays advance simultaneously (or as close to simultaneously as possible). He does this to narrow the temporal coverage of his order.
35. While still in the zoomed display, he requests that he receive all three data sets for the area and specifies the temporal range he would like as: $t - 8 \text{ hrs} < t < t + 12 \text{ hrs}$, where t is the time of the most recent data in each set. **NOTE:** this will cause an "immediate" order for data already available (the previous 3 hrs), as well as a "standing" order for the next 3 hrs of data as it becomes available. Occasionally, he will not need all three data sets, so before ordering, he will have to "de-select" the undesired data sets. Then he logs off.

Other data products that Dr. Lopez would like to view and order in this way (side-by-side windows, movie-loops) are: cloud top heights and precipitation amounts.

Figure 10-3. Science Scenario #15 "Daily Access of Lightning Data" (5 of 5)

Grassland Scenario (4/27/94)
(Revised Oct 18,1994)
Scenario #3 - Don Strebel

Overview: Graduate student at Henry Horn wishes to test ecological theory regarding vegetation competition in grasslands across the central United States. The student wants to know where he can find data to test the theory - he needs ways of identifying and getting data, but will use his own tools to do the analysis. After doing a literature search, the student finds the ECS 1-800 number to call, in a publication.

1. Graduate student calls ECS and asks for all the data available on grasslands in the U.S. from 1901 to the present. Consultant conducts a query on this data. Over 2000 hits are returned. Consultant informs student of large number of hits and helps guide student by asking the student what kind of comparison he wants to make.
2. The student replies, "I'm looking for a time series of consistent data that captures all of the grasslands in the U.S." Consultant conducts a query with this information. 1572 hits are returned. Consultant informs student of large number of hits and asks the student what type of specific information he requires about the grasslands.
3. The student replies, "I am interested in precipitation, LAI and Regional Global Change Susceptibility Index data from 1901 to present for a minimum 5 year period, for purposes of development and prediction." Consultant conducts this refined query. 123 hits are returned.

Figure 10-4. Science Scenario 3 "Grassland Scenario" (1 of 2)

Grassland Scenario (4/27/94)
(Revised Oct 18,1994)
Scenario #3 - Don Strebel

4. Consultant notices that most returned hits are contained in a data set entitled "Integrated Grassland Data for Central U.S." and asks the student if he would like more information. The student replies that he would like more information on the "Integrated Grassland Data for Central U.S." Consultant conducts query on this data set. Consultant receives GUIDE information for data set on screen. Consultant reads the price and description of the data set to the student and asks the student if he would be interested in receiving a detailed description of the data set and contents, along with the previous hit list and an order form. The student replies that he would like this information. Consultant takes student's name and address and prints hard copy of session and mails this to the student.
5. The student receives hard copy and order form within one week.
6. The student mails in an order for the "Integrated Grassland Data for Central U.S." data set. Consultant places an order (10GB in volume). Consultant sends the 10GB of data (on optical disc) to the student within one week.
7. The student replies that he would like more information on the "Integrated Grassland Data for Central U.S." Consultant conducts query on this data set.
8. Consultant reads the price and option of the data set and asks the student if he would be interested in receiving a detailed description of the data set and contents, along with the previous hit list and an order form.
9. The student replies that he would like this information. Consultant takes student's name and address and prints hard copy of session and mails to student.
10. The student receives hard copy and order form within one week.
11. User mails in order for the "Integrated Grassland Data for Central U.S." data set. Consultant places order (10 GB).
12. Consultant sends 10 GB optical disc set to student within one week.

Figure 10-4. Science Scenario #3 "Grassland Scenario" (2 of 2)

10.1.2.1 Test Case B100120.010-Data Access Privileges

The Data Access Privileges test case verifies that the user can readily access ECS and utilize all of its available services. This test is conducted under the presumption that the user is already a registered ECS user with full privileges (read, write, update, and delete). The Test and Demonstration methods are used to verify the users ability to access the data base, modify a users access rights by user and data type, and limit updates to security controlled data by controlling the access to that data. The Test method is also used to verify that a data access log is maintained.

During additional testing, the Demonstration method is used to verify that the DAAC provides interactive and batch information management capabilities for authorized users to add, update, delete, and retrieve information from the DAAC data bases. The Demonstration method also verifies the DAAC's ability to maintain or provide access to directory entries for all data sets through the DAAC search and order service.

In order for the user to access the ECS DAACs, the following user login information is necessary: user name and password; user profile information such as the user's mailing, shipping address, e-mail address, and other contact information; and the type of desired service: directory search, inventory search, guide search, and/or data browse.

The results of this test are as follows: The ECS client launches its login screen, the system authenticates the user's identity and presents last login day and time, the system logs (records) the user's login date and time, the user verifies being on-line at the specified day and time indicated by ECS, and finally ECS launches a graphical user interface (GUI) that indicates the services that the user is authorized to access and presents the option to request additional services.

10.1.2.2 Test Case B100120.020-Information Search

The Information Search test case verifies that the user has the capability to utilize the advanced search functionality. These services include inventory metadata (including non-geographic) search, directory search, and guide search. This test differs from the previously mentioned test cases for the New Science User Sequence because it verifies requirements that relate to more complex searches, which includes multiple searches across multiple data sets for coincident occurrences of data in space and/or time and all other attribute(s) of metadata.

The appropriate sections of the "Daily Access of Lightning" Data Scenario (Figure 10-3) are referenced to test and demonstrate the aforementioned functionality. This scenario is modified by the Acceptance Test Team to completely verify the relevant requirements. The Demonstration method is used to verify that ECS provides the capability for the user to incrementally search the guide without detailed knowledge of the ECS in order to locate descriptions at the parameter level that are related to his research. The user specifies a keyword of "LIS" and "Continental United States and coastal areas" as the search criteria to locate the desired information. While executing this test, the Demonstration method is also used to verify that ECS provides a "friendly interactive interface" that provides on-line support for the experienced user (i.e. quick command driven information input) by responding to user inquiries for status of user-initiated requests and history on those requests.

Once the user has noted the description of the products, the Demonstration method is used to verify that ECS provides the capability to search for metadata which provides a cross reference that relates the science data to the calibration data, the navigation data, the instrument engineering data, and to the algorithms used to generate the product. While executing this series of time-intensive searches, the Demonstration method is used to verify that ECS provides the user with informational messages that indicates that a query is being executed. During a time-intensive query, the Demonstration method is also used to verify that the user has the capability to stop any time-intensive operation.

Finally, the Test method is used to verify that the ECS provides the capability to produce reports that trace the data back to the source instruments, relates the data sets to processing software and algorithms and data generation, and produces products with supporting data that is used by data recipients.

The expected results of this test are as follows: the ECS client launches several windows which include descriptive information from the inventory describing the data sets of interest, on-line support, the metadata that the science software packages used to generate the product of interest is displayed, and QA statistics provide information about product validation. During this test, the ECS client displays informational messages which provides the option for the user to abort any of the time-intensive operations.

10.1.2.3 Test Case B100120.030-Data Browse

The Data Browse test case verifies that ECS provides the capability to perform geographic and geophysical overlays to help in the selection of spatial data and to enhance the display of metadata. This test also verifies that the ECS provides the capability to query geographic metadata by the following criteria: geographic reference, data element content, minimum bounding rectangle, point and radius, polygon, and/or geographic name. Using the "Daily Access of Lightning Data" Scenario (Figure 10-3) as reference, the user must specify the "LIS" and "Continental United States and coastal areas" as search criteria and then query the guide for Event Data, Observation Time, and Single Events.

The Demonstration method verifies that users produce a contour plot of the Single Event Data, overlay the contours on a map of the continental U.S., and sends it to the screen for inspection. While executing this test, the Acceptance Test Team modifies the scenario to demonstrate the capability of ECS to display geographic metadata and conduct multiple simultaneous sessions. Using contour plots that were returned from the previous execution, the user draws a polygon that encloses the closely-spaced contours in Florida. The user then requests that the system "zooms in" on the enclosed area. While in this "zoomed" display, the Demonstration method is used to verify that the user is capable of browsing 12 hours preceding the current map by viewing it as a "movie loop".

The system responds by displaying contour plots of the Single Event Data which is an overlay of the contours on the map of the continental U.S. that illustrate the areas of heavy activity in central and southern Florida and southern Arizona. This display produces the actual full-resolution Single Events overlaid on top of the "zoomed" map of the enclosed area of Florida. By using these displays, the Demonstration method is used to determine the amount of data expected to be returned as a result of a product order and provides that information back to the requester. These series of events are all used to verify the browse capabilities of ECS.

10.1.2.4 Test Case B100120.040-Data Product History

The Data Product History test case verifies that ECS provides the capability to search a product's processing history and make the information available to the user. Using step 18 of the "Daily Access of Lightning Data" (Figure 10-3), the Demonstration method verifies that the user requests the product history of the data used to produce the contour plots. The Test and

Demonstration methods are used to verify that all DAAC's provide the capability to subset, subsample or average data and products ordered from other DAAC's.

The Demonstration method also verifies that once the product history is requested, from either a normal request or an ad-hoc request, the DAAC receiving the request retrieves all available information from their archive and displays all appropriate inventory information. Next the Demonstration method is used to verify that each DAAC transfers all data and Standard Products that have been requested, to the requester. Finally, using the Demonstration method, each DAAC provides a record of all data orders to the SMC for the purpose of maintaining a full and complete history of all data orders.

Using "LIS", "lightning", and the "U.S." as search criteria, the user queries the lightning data from LIS. The system then responds with a message stating that there was a problem with the "Single Events" generation.

10.1.2.5 Test Case B100120.050-One-Time Orders

The One-Time Orders test case verifies that ECS accepts and validates requests for ECS archival data products from its users. This test also verifies that ECS has the capability to generate and update requests for one-time orders from the data archive to distribute archive holdings. The "Daily Access of Lightning Data" (Figure 10-3) is used to demonstrate this functionality. The Test method verifies that while the user is visualizing the various contour plots as a movie loop, the user orders data for a given time span (see Figure 10-3). This query causes an immediate order for data already available to be generated.

The Test method is used to verify that each ECS DAAC accepts requests, updates/cancellations to requests, and verifies product orders from other DAAC's in order to distribute archived data to requesting users as a result of the Product Processing Order. The Test method is also used to verify that each ECS DAAC maintains a database of orders that include all details necessary to process standing and multi-DAAC orders. The Test and Demonstration methods verify the capability of each ECS DAAC to support the prioritized retrieval and delivery, of any data granule stored in the archives in response to a product order in approved formats (including HDF). The Test method is also used to verify that the ECS DAAC uses information provided by the processing section to notify users of processing delays, provide reasons for the delays, and modify arrival times.

The Demonstration method verifies that ECS DAAC's have the capability to manually override the priority of any distribution request received from the user community to include: Data Acquisition Requests, Data Distribution Requests and Reprocessing Requests. The Demonstration method is also used to verify that data order capabilities are integrated with metadata search capabilities at the ECS DAAC's in order to accept, validate, and fill orders from users for information stored at the ECS DAAC's.

The Demonstration method verifies that the ECS DAACs provide the capability for users to generate, update, and distribute requests for one-time or standing orders for Standard Product software and associated documentation in accordance with EOSDIS distribution criteria and receive data order status from the DAAC once the data has been shipped.

The Test method verifies that the search and order service at the ECS DAAC's allows users to determine the location of desired data products, construct or submit data order requests for products, based on any combination of the inventory core metadata attributes and geophysical parameters, and submit the product order to the data center where that data is archived. The Test Method is also used to verify that the ECS DAAC maintains a cross reference of lists of processing performed, data sets produced, supporting data used, and tracks who receives the data.

The Demonstration method verifies that each ECS DAAC sends users data, special products, metadata, ancillary data, calibration data, correlative data, documents, algorithms, and planning and scheduling information and system processing schedules to users.

The Test method verifies that the Client subsystem accepts and validates requests from the ECS users for ECS archival data products and then determines if requested data products and lower level products exist and are retrieved or determines the processing required to generate the requested product. Next the Test method is used to verify that the ECS DAAC sends the product orders, priority, and the suggested start and completion times for processing to the ECS elements responsible for processing and distributing the product.

The Test method verifies that the ECS DAACs provide the capability for users to construct Product Orders and prepare Product Processing Orders that specify processing and data used to generate products containing identification and expected time/window of receipt of the product(s), ancillary data, product processing priority, destination(s) of product output, and suggested earliest start and latest completion time.

Scenario #15 (See Figure 10-3) did not specify how the data and its parameters were going to be delivered, so the Acceptance Test Team modified the scenario to demonstrate that this data could be received via ftp. To order the data and its parameters, the user specifies that he wishes to receive data for the time span given in the scenario. The system responds by sending lightning data and its parameters via ftp, and notifies the user via e-mail that the data was successfully transferred.

10.1.2.6 Test Case B100120.060-Standing Orders

The Standing Orders test case verifies that ECS has the capability to generate and update a request for standing orders for the data archive to distribute archive holdings that include Standard Products, Standard Product software, EOC historical data, spacecraft housekeeping, ancillary data, and engineering data. The "Daily Access of Lightning Data" (Figure 10-3) written by Dr. Raul Lopez and collected by Lori Tyahla of the Science Office demonstrates this functionality.

While viewing the movie loop of the enclosed area of Florida, the Demonstration method verifies that the user can order an additional eight hours of data. This test also verifies that ECS can display or transfer data based on the request of the user. In this instance, the user specifies that the data must be displayed as a contour plot once it is received by the workstation. To display the contour plots, the user must specify the region of Florida that is of interest and the required time span.

The system responds by displaying the actual full-resolution Single Events (by plotting a "o" or a "+" for each event at the latitude/longitude at which it was detected) overlaid on top of a zoomed map of the enclosed area of Arizona.

10.1.2.7 Test Case B100120.070-Reprocessing

The Reprocessing test case verifies that ECS has the capability to notify the user community when data has been reprocessed. Reprocessing is driven by a reprocessing request which is generated in the event of the availability of improved input data, new/improved calibration data, and/or algorithm updates. Products that are resubmitted due to a failure of any kind during processing are considered to be a part of standard processing, not reprocessing.

The "Daily Access to Lightning Data" Scenario is modified by the Acceptance Test Team to test the requirements that relates to reprocessing. The Demonstration method is used to verify that a simulated Reprocessing Request has been received from the ECS user community. To verify this requirement, the algorithms used to generate the contour plots are modified to improve the resolution. After the algorithms were modified, the data used to generate the contour plots is reprocessed to generate improved single events data. The Demonstration method also verifies that ECS notifies the ECS user community that the data has been reprocessed.

To view the contour plots that uses the reprocessed single events data, the user requests to receive this data and have it displayed on his/her workstation. The system responds by displaying the contour plots on the user's workstation with a system message stating that single events data was reprocessed.

10.1.2.8 Test Case B100120.080-Distribution Medium

The Distribution Medium test case verifies requirements that demonstrate the capability for ECS to distribute data on-line or off-line in a variety of pre-approved formats. The Demonstration method verifies that each archive has the capability to distribute data in a multi-level priority system, using a variety of approved high level density storage media such as 8-mm tape, 4-mm DAT, 3480/3490 tape, CD ROM, and 6250 tape. The "Grassland Scenario" (Scenario #3, Figure 10-4) that was written by Dan Stroebel from the ECS Science Office demonstrates this functionality. This scenario demonstrates that the user can order 10 GB of "Integrated Grassland Data for Central U.S." data set on CD ROM.

Prior to ordering the Integrated Grassland Data, the Test method is used to verify that each DAAC has previously verified the requester's data access rights which allow them to receive the data that they have requested. Once this is has been completed, the Demonstration method is used to verify that the data is copied in the physical media specified in the original product order.

Next, the Demonstration method is used to verify that the user can receive a detailed description of the data set and its contents off-line in hard copy format via mail. Then this test uses the Demonstration method to verify that the ECS has the capability to distribute information on-line (over a network) and via FAX. Instead of the user receiving the detailed description for the data set and its contents via mail, the scenario is modified by the Acceptance Test Team to verify that ECS is capable of sending information over the network via ftp.

To acquire the Integrated Grassland Data, the user specifies simulated precipitation data, LAI and Regional Change Susceptibility Index data and a data set entitled "Integrated Grassland Data for Central U.S." as the search criteria. The system responds with the most hits on the "Integrated Grassland Data For U.S." data. After conferring with the student, the user decides to order 10 GB of "Integrated Grassland Data" data on CD ROM, a hard copy and soft copy of inventory and guide information for the "Integrated Grassland Data For U.S." data set, via mail and via ftp, respectively.

10.1.2.9 Test Case B100120.090-Application Programming Interfaces

The Application Programming Interfaces test case verifies that ECS provides configuration-controlled application programming interfaces (API's) that are capable of supporting development of extensions to the ECS Client and the data archive system by the DAACs.

During the API software delivery, any API software that has not been delivered in the previous release's, is included. Since the new DAACs, added for this release (JPL, NSIDC, ORNL, and ASF), have just received the software, it is not expected that any of the API's have been used, and no actual DAAC extensions are therefore in place. Instead, the Acceptance Test Team uses the Inspection method to prove that the API's are part of the Release and are usable to build the following user interface extensions: a) Addition of metadata fields that are unique to the DAAC; b) Addition of documents for use as guide metadata; c) Support of data visualization utilities; d) Support of DAAC-specific data analysis utilities; e) Development of DAAC-unique metadata searching and services; f) Development of a local user interface. For the data archive system these API are used to develop DAAC unique data distribution services and a custom operator interface.

This results of this test is that all required software is resident at each DAAC and it's located in the appropriate directories. This test also confirms the presence of all read software and users manuals at each DAAC.

10.1.2.10 Test Case B100120.100-ECS Client Operations

The ECS Client Operations test case verifies requirements that relate to data base administration, data base maintenance, communication services, user tools, ECS resources history, and ECS operations summaries for the ECS client.

By using the Demonstration and Analysis methods this test case verifies that ECS provides data base administration utilities to modify the data base scheme, performance monitoring, administrate user access control, on-line incremental backup, on-line recovery, and export/import of data. The ECS also provides the capability to restructure the database and interrupt a maintenance session and restart the session without loss of information.

The Demonstration method also verifies that ECS provides its users with file transfer, multimedia mail, and electronic bulletin board communication services. The ECS operator performs a series of commands to test this functionality. These include transferring files to the user, and utilizing the electronic mailing system. The expected results for this test are successful manipulation of all the listed communication services.

By using the Test method, this test case verifies that each ECS DAAC has the capability to maintain control of data base access, manipulate user access, update security controlled data, and maintain a data access log. The Test method also verifies that ECS client at a DAAC provides the SMC with a full and complete history of all ECS resources used by science investigators, which includes CPU utilization, amount of user storage, connect time, and session histories. Using the information recorded by the system from previous tests as input, the SMC requests a history of all ECS resources used by science investigators.

The system responds by notifying the SMC via electronic mail that the information was sent successfully. This information is distributed to the SMC on-line (i.e. over the network) using the file transfer protocol (ftp). While executing this test, the Test and Demonstration methods are also used to verify the capability for ECS to distribute reports on a periodic basis to a pre-defined list of report recipients on-line, and off-line either by paper or electronic media. These reports include: backlog of outstanding data distribution request, outstanding processing request, data quality assessment, and ECS performance summaries.

10.1.3 ECS/Version 0 (V0) System Interoperability Sequence

This sequence demonstrates that the ECS and the V0 systems via the V0 system level Communications Subsystem, work together to exchange data and information. Interoperability between ECS and the V0 system is demonstrated by either system interacting with the other system's information server. Thus the ECS data holdings are accessible for viewing and ordering by the V0 user. V0 data holdings are also accessible for viewing and ordering by the ECS user.

Before a user accesses the data archived in the ECS or V0, the user must be authorized to receive the specified data. The ECS user identifies data of interest that is archived in the V0 system using the ECS Advertising Service (EAS). The EAS provides search and order services for accessing V0 data holdings. V0 products are delivered directly to the ECS user on physical media or electronically per the user's request.

The V0 user identifies data of interest that is archived in the ECS, using the V0 Communications subsystem client, which provides search and order services for accessing ECS data holdings. ECS products are delivered directly to the V0 user on physical media or electronically per the user's request.

10.1.3.1 Test Case B100130.010-Version 0 Data Storage in ECS

The Version 0 Data Storage in ECS test case verifies requirements related to ECS providing storage for Version 0 data. This test uses the Demonstration method to show that V0 data is on-line and by analysis, demonstrates that the necessary archive storage space is available for all V0 data migrated into ECS. The System Design Specification(s), as built documentation and vendor hardware specifications for archive devices, are used as the basis for determining the archive capacity at each site. This information is then compared to the data sets selected for migration during the Release B delivery as shown in Attachment G of the Technical Baseline for the ECS Project. The information contained in Attachment G of the Technical Baseline was derived primarily from Appendix A of the Science Data Plan. The documentation demonstrates that ECS

has sufficient archive capacity in tera-bytes (TB) to store all V0 data and associated documentation, algorithms, etc.

10.1.3.2 Test Case B100130.020-ECS User Access to Version 0

The ECS User Access to Version 0 test case verifies that ECS provides an Advertising Service interface that allows V0 to identify the data holdings at each DAAC. The Test method is used to verify that the ECS Advertising Service gives the ECS user the ability to search and identify Version 0 data of interest.

Through the use of a series of queries generated for guide, inventory and browse, this test case verifies that when an ECS user requests information that is held in Version 0, ECS determines which V0 DAAC system holds this data and passes the request to the appropriate Client Server. The queries (guide search request, browse request, inventory search request) are passed from ECS to the DAAC Client Server. Finally, the results of the query are passed from the V0 DAAC(s) to ECS. All query results are the same as query results generated from the V0 Communications Subsystem (this verifies proper translation of the ECS query to V0 protocols).

The requirements verified in this test case support the functionality described in the "Version 0 EOSDIS Information Management System Users Manual", July 1994, Science Scenario #1 (Figure 10-5) "Inventory and Guide Searches" and Science Scenario #5 (Figure 10-6) "Inventory and Browse Searches".

Kathryn Neel

Ph.D. student needs information for dissertation literature review

User requests (via telephone) all general documentation on the TOMS instrument and technical documents characterizing the bandpass

User requests additional information regarding digitization of signal, including signal error.

User asks about the availability of Level 0 measurements from the TOMS instrument and the availability of satellite radiance measurements.

User requests data set cost information

User requests list of existing algorithms used to produce Ozone images

User requests information on SOLSTICE data products, specifically those that measure solar spectrum in the range of 3125Å to 3400Å.

User would like a listing of all electronic journals relevant to his field of interest.

User requests hard copy list of algorithms, information on SOLSTICE data products, and lists of relevant electronic journals. User requests order forms

Consultant receives user requests for TOMS data and sends 15 MB CD-ROM sent to user.

Figure 10-5. Science Scenario #1 "Inventory and Guide Searches"

Jeff Dozier
Earth Science researcher wishes to access electronic journal
Locate electronic journal (Assuming it is a monthly)
Display table of contents for selected issue. Select by point and click
Display first page of selected article
Display list of figure captions in order of appearance
Display selected figure
Display conclusion of article
Send me article currently being reviewed, now.
Re-display table of contents for same issue
Display first page of selected article = ZZ
Return to table of contents
Display first page of selected article = YY
Display list of figure captions in order of appearance
Display selected figure
Download current figure and first page of current article now.
Display selected figure

Figure 10-6. Science Scenario #5 "Inventory and Browse Searches"

10.1.3.3 Test Case B100130.030-ECS and V0 Search and Order

The ECS and V0 Search and Order test case uses the Test method to verify that a user logged on to the ECS Client constructs and executes a query that searches the holdings of both ECS and V0 DAAC's and returns the correct list of guide data. It also tests to verify that a single query is constructed that does the same for inventory data. In addition, it is verified that V0 held browse data is accessed and displayed on the ECS client. In this test the user generates the queries for guide, inventory and browse requests from the ECS client.

The Test method is used to verify that an ECS user may request a product from the V0 archives. This request is passed by the ECS to the ESDIS Communications Subsystem Server via V0 protocols. The test case verifies that the V0 DAAC sends the product directly to the authorized user either on physical media or electronically per the user's request.

For queries going to the V0 system, all query results are the same as query results generated from the V0 Communications Subsystem (this again verifies proper translation of the ECS query to V0 protocols). For queries sent to ECS DAAC(s), query results are compared to a list of datasets (along with associated guide and browse data, documentation and algorithms), to verify that queries returned the correct results for each ECS DAAC. All product requests are verified as being distributed (network and tape) to the user account used for the test.

10.1.3.4 Test Case B100130.040-Version 0 User Access to ECS

The Version 0 User Access to ECS test case verifies that a user logged on to the Version 0 Client Subsystem is able to query for and access data in ECS. This test uses the Demonstration and Test methods to verify that when a V0 user wants to request information using the ESDIS V0 Communications Subsystem, the ESDIS V0 Communications is able to send the query to the applicable ECS DAAC(s) and receive and display the response.

During the test a series of queries are entered from the V0 Communications that are sent to the applicable ECS DAAC(s), with at least several queries going to each V0 DAAC (EDC, MSFC, GSFC, LaRC, NSIDC, JPL ORNL and ASF). These queries include requests for inventory, guide and browse data.

The user authentication is sent by V0 and received by ECS. ECS (each DAAC) receives the applicable queries for inventory, guide and browse data and return the appropriate data to the V0 Data Management Subsystem for display.

10.1.3.5 Test Case B100130.050-V0 and ECS Search and Order

The V0 and ECS Search and Order test case verifies that a user logged on to the V0 Data Management Subsystem is able to construct and execute a query that searches the holdings of both V0 and ECS DAACs and returns the correct list of guide data, and a query that does the same for inventory data. In addition, it is verified that ECS held browse data can be accessed and displayed on the V0 Data Management Subsystem.

This test also uses the Demonstration and Test methods to verify that once a V0 user identifies data of interest in ECS, products may be requested from ECS. The request is passed by the ESDIS V0 Communications Subsystem to ECS using V0 standards and protocols. This test verifies that ECS sends the data directly to the user either on physical media or electronically per the user's request. It is also verified that upon user request, the ESDIS V0 Communications Subsystem may request and receive product delivery status from the ECS.

During the test, a series of user generated queries for inventory, guide and browse data that cause a search of both ECS and V0 DAAC's. These queries are constructed in such a way as to cause the queries to go to each ECS DAAC (ASF, JPL, EDC, GSFC, LaRC, MSFC, NSIDC and ORNL). The queries are for data migrated to ECS. The user then reviews the results of these queries and orders data from the any or all of the ECS DAAC's.

As a result of the queries described above, the user authentication should be sent by ECS and received by V0. All ECS and V0 DAAC's should receive the applicable queries for inventory, guide and browse data and return the appropriate data to the V0 Data Management Subsystem for display. Each order for data from the ECS DAAC's should be filled correctly.

10.1.4 EOSDIS Core System (ECS)/Affiliated Data Center (ADC)/Interoperability Sequence

The ECS/ADC sequence confirms that an ECS science user can access, search, and view pertinent NOAA ADC data holdings at the National Environmental Satellite Data and

Information Services (NESDIS) Satellite Active Archive (SAA), National Climate Data Center (NCDC) and National Oceanographic Data Center (NODC), and the National Meteorological Center (NMC). The sequence assures that the NOAA ADC work in coordination with ECS to allow the ECS user to establish NOAA data holdings' communication access, search, and view per ICD specifications. The sequence also demonstrates that the ECS operations staff efficiently transmits data to authorized requesters.

The sequence confirms that communication between the ECS and the NOAA ADC is supported by the appropriate networks, as required by the user specifications for data to support ECS data production, or for data in response to queries and searches. The science user can view billing costs based on MOU's for the ADC and Non EOSDIS data centers prior to submitting data product orders. EOS data and data products are delivered on a variety of physical media to the ADC's and other science users via EOSDIS networks.

The process of searching and viewing the data holding of the sequence guides the science user through the steps required for submitting a user authentication request. Once access privileges are granted, the user continues to generate queries to search inventory, directory and guide metadata and to browse particular products.

Accessing data holdings of the NOAA ADC's tests the following ECS user capabilities: ordering data products, algorithm packages, and documents; accessing L0-L4 data, metadata, ancillary data, calibration data, correlative data and spacecraft and instrument logs; initiating standing orders; exchanging directory data with International Partner (IP) data centers and ADC's; and requesting the status for previous orders.

10.1.4.1 Test Case B100140.010-ECS User Access NOAA ADC

The ECS User Access NOAA ADC test case verifies that a system advertising service for all applicable NOAA ADC's is available to the ECS user and that the user has access to the services. The Demonstration, Test and Analysis methods are used to verify authorization, guide, browse, and search requirements.

When the user logs onto the system, the system verifies the ECS user's level of security after specific parameters for services is entered. Once the level of security is established, the test case verifies the ECS User can access the NOAA ADC's from the ECS client.

This test case verifies that the ECS user's request for information is sent successfully to the NOAA ADC's and that the requested information is received by the ECS user from the NOAA ADC's. The user's requests take the form of guide, inventory and/or browse requests. The user should receive a displayed list for each query under the parameter established by the user when requesting the information.

In addition, the user may query the system for a product availability list or the user may request the availability of a specific product. Once the user receives the product availability list the user can request a cost estimate for the product. The user should receive the product availability list on screen or just the single specific request. The system Advertising service also makes a cost estimate available to the users. The screen should display the cost estimate for the product or products upon request.

10.1.4.2 Test Case B100140.020-ECS User Request NOAA ADC Product

The ECS User Request NOAA ADC Product test case verifies that the ECS user's request for NOAA ADC products is sent to each NOAA ADC. The Demonstration, Test and Analysis methods are used to verify product request requirements. The test case verifies that the ECS user receives the requested products, including products requested as ancillary data followed by the data availability schedule and the data availability notification. The following products are accessible to the ECS user: L0-L4 equivalent data sets, calibration data, documents, algorithms, correlative data, and ancillary data.

The user executes guide queries to determine the composition of the products. The guide query provides the user with a detailed description of a number of data sets and related entities. Once the user decides on the product, the user can order the information.

The system should send an acknowledgment of the product request. The user is notified of the data arrival via a notice received in the user's message box.

10.1.4.3 Test Case B100140.030-Product Status Request

The Product Status Request test case verifies the user's ability to request product delivery status after a product has been requested. The Demonstration, Test, and Analysis methods are used to verify the ECS user's product delivery status request requirements. This test case verifies that the product delivery status request is sent to the applicable NOAA ADC and that product delivery status is received by the ECS user.

Once a product has been ordered, the user may request on the status of the product on-line. The user should receive the status of the requested product on-line. The status message notifies the user of the products status.

10.1.4.4 Test Case B100140.040-ECS User Search

The ECS User Search test case verifies that an ECS user's can construct and execute queries that search both the ECS and the NOAA ADC archives. The Demonstration, Test, and Analysis methods are used to verify that the queries are sent and the ECS user receives the correct data from the NOAA ADC and ECS archives. The data is displayed on screen and the user may browse the data.

The ECS user queries the system for a product that will search both the ECS archives and the NOAA ADC archives. The user should receive the requested data on-line.

10.2 Science Computing Facility (SCF) Scenario

There are a number of Science Computing Facilities associated with ECS DAAC's for this release. The Table 10-2 shows each DAAC and the SCF(s) and instrument(s) that are associated with each respective DAAC or SCF. This scenario will be modified to include test functionality related to data search, inventory search, search criteria, browse, guide, query, product order, and product request at NSIDC and ORNL DAACs. When the AT Team is at the LaRC DAAC, for example, scenarios are conducted to verify: science software integration support, product QA,

data search and order, and data management services for each of the five SCF's associated with the LaRC DAAC, as shown below in Table 10-2. The following paragraphs describe the SCF Scenario in greater detail.

Table 10-2. DAACs and Associated SCFs and Instruments

DAAC	Instrument SCF
LaRC	ACRIM SCF
LaRC	CERES SCF
LaRC	MISR SCF
LaRC	MOPITT SCF
LaRC	SAGE III SCF
GSFC	MODIS SCF
GSFC	COLOR SCF
JPL	MR SCF
JPL	SeaWinds SCF
JPL	DFA SCF
MSFC	LIS SCF
NSIDC	MODIS SCF
EDC	MODIS SCF
EDC	ASTER SCF

This scenario confirms that EOS investigators are provided access to the ECS tool kits for the applicable SCFs to perform the following activities: develop and maintain standard data production software, perform quality assurance (QA) of standard products, administrate and manage local data bases for each site, request production status and history files, request resource usage updates, and update calibration coefficients.

The Virtual System Management Subsystem software operates with a local data base using an ECS supported DBMS provided by the Science Computing Facility (SCF). This management software provides the following: Data Production Software Delivery Package; Request for Resource Usage for information about ECS resource usage during SCF-requested data processing; and Product History of data products that the SCF specifies.

The Planning/Data Processing Subsystem software allows ECS to receive product QA information which contains the Identification of Product; QA results; and Product storage and processing instructions. When apparent data problems occur and are reported to the SCF's via a Data Quality Notification, proper steps are taken to ensure prompt science investigator action is taken.

The science investigator has the ability to develop and transmit science data production software for use by the ECS. This software provides an initial Delivery Package containing the Science Data Production tools that are necessary to begin development. The process for completed development package delivery to the DAAC and integration and test procedures for these packages is also confirmed. The product history files standard format is analyzed to assure inclusion of specific file components have been included.

10.2.1 MSFC DAAC-SCF (LIS) Sequence

The MSFC DAAC-SCF sequence verifies that the ECS is accessible by users at the LIS SCF site and other sites supported by the MSFC DAAC. For example, The Science Scenario Model #15 "Daily Access of Lightning Data" by Dr. Paul Lopez forms the basis for these test cases. Using this Science Scenario, the user tests functionality related to data retrieval and product ordering at this DAAC.

The MSFC performs the following TRMM Mission operations: ingest LIS level-0 data; produce LIS higher level product; provide Special Sensor Microwave/Image (SSM/I) and Global Precipitation Climatology Project (GPCP) data, and store of TRMM Science Data and Information System (TSDIS) products for PR, TMI, and GV; distribute TMI data to LaRC for use in CERES processing; and Interoperability with new DAAC's.

The MSFC DAAC also performs the data archival and distribution functions for the general science community in the areas related to the hydrologic cycle. Acceptance testing scenarios are used to verify that science software installation and maintenance support, product QA, data search and order, and data management services are conducted at the SCF's and between the SCF's and ECS. The LIS data and products are the responsibility of the MSFC DAAC. Release B provides new and enhanced functionality to the software developed for the MSFC SCF during the Release A time frame.

10.2.1.1 Test Case B100210.010-MSFC Science Software Installation and Maintenance (SSI&M)

The MSFC Science Software Installation and Maintenance test case verifies by using Test, Analysis, and Inspection methods that the ECS SSI&M personnel provides support in developing and testing algorithms (via E-mail and phone contacts) and QA of produced data products. The science users including PIs generate and transmit a quality report about data products to the appropriate segment of the ECS project.

Using the Demonstration method, a user at the MSFC SCF invokes an icon on the desktop to activate the Advertising Service. A screen appears with a selection of keywords, spatial, temporal and other constraints. Upon entering these parameters, an HTML window is displayed. The user examines and receives algorithms; searches and obtains standard L0-L4 data with corresponding metadata, ancillary data, calibration data and correlative data for use in developing and testing algorithms. The user at the MSFC SCF utilizes EOSView to help analyze algorithm test products, calibrate data, verify parameters and detect anomalies.

10.2.1.2 Test Case B100210.020-MSFC Product QA

The MSFC Product QA test case verifies that a member of the MSFC DAAC is able to view a list of products requiring QA by the SCF's. Using the Test and Analysis methods, a user at the MSFC SCF transmits a status message to confirm or reject processing order. A list of products are maintained requiring QA by the SCF.

Using the Demonstration method, it is verified that a user at the MSFC SCF has the ability to request and receive a product and its associated metadata from the ECS for QA, interface with

ECS QA personnel for product QA support (via E-mail and phone contacts) and send QA reports to the ECS. The user receives product QA information from the SCF which contains the identification of product, QA results, and product storage and processing instructions. The ECS has the ability to append the quality reports to the associated archived data products.

10.2.1.3 Test Case B100210.030-MSFC Data Search, Browse, Request Access and Receive

The MSFC Data Search, Browse, Request, Access and Receive test case verifies that a user at the MSFC SCF searches the ECS for Level 1 (L1) - Level 4 (L4) products and uses the Browse service to view these products. For this test, the focus is on the ability for the SCF user to access data related to pre-launch checkout of the LIS instrument. The user utilizes the Data Processing Subsystem software to provide tools to support the preparation or automated generation of directory, inventory, and simulation of an on-line Data Processing Subsystem training session.

Using the Test and Demonstration methods, a user selects the system Advertising Service, which enables the user to choose various constraints: keywords, spatial, and temporal. Upon entering these parameters, an HTML window is displayed showing all available services which the user is authorized to access. The user at the MSFC SCF is able to request and receive Level 1 (L1) - Level 4 (L4) products, browse data, documents, accounting information, unstructured text, binary unstructured data, binary sequential data and sequential text. A user constructs requests for Client Subsystem services, forwards the requests to the Client Subsystem server, and obtains request results.

A user utilizes the Data Processing Subsystem data visualization to visualize animated product and data (i.e., vector and raster formats). The user generates 2-D, 3-D, and Contour plots and 3-D surface diagrams. Then, the user manipulates (i.e., pan, zoom, color, contrast) the image for statistical analysis. The user at the MSFC SCF interfaces with ECS personnel for support in generating new search services (via E-mail and phone contacts to ECS personnel) that dynamically browse the data and metadata.

10.2.1.4 Test Case B100210.040-MSFC Data Management Services

The MSFC Data Management Services test case verifies by using the Test and Analysis methods that the user at the MSFC SCF uses the System Management Subsystem to provide services for metadata management for local SCF metadata. This software also provides local interactive and batch data management to search, add, update, delete, and retrieve metadata. The System Management Subsystem operates the local SCF data base by using an ECS supported DBMS (provided by the SCF) to perform the following administration utilities modifying the data base scheme, monitoring the performance, administrating the user access control, and data base backup and recovery.

The System Management Subsystem allows users to locate and identify desired data without having detailed knowledge of the systems. A user selects data for retrieval by boolean operators, relational operators, attribute values, and a combination thereof from the data base. This test also demonstrates that a user at the MSFC SCF uses the System Management Subsystem to simulate an on-line training session.

10.2.2 LaRC DAAC-SCF's (ACRIM, CERES, MISR, MOPITT, and SAGE III) Sequence

The LaRC DAAC-SCF's sequence verifies that the ECS is accessible by users at the ACRIM, CERES, MISR, MOPITT, and SAGE III SCF sites supported by the LaRC DAAC. For example, The Science Scenario Model #13 "Review Paper about the Earth Radiation Budget (ERB)" by Bruce Barkstorm, collected by Haldun Direskeneli and written by Tess Wingo of the ECS Science Office forms the basis for these test cases.

Using this Science Scenario, the user tests functionality related to data retrieval and product ordering at this DAAC. The LaRC performs the following AM-1 Mission operations: ingest ACRIM, SAGE III, CERES, MOPITT, MISR level-0 data products from EDOS; produce CERES/MOPITT/MISR/ACRIM/SAGE III higher level products; access to data V0 products. This DAAC also supports Science Software I&M for SAGE III and ACRIM instruments; archive and distribution of product QA at SCF's and User access; Interoperability with new DAAC's and TRMM mission support.

The LaRC DAAC also performs the data archival and distribution functions for the general science community in the areas of radiation budget, clouds, aerosols, and tropospheric chemistry. The ACRIM, CERES, MISR, MOPITT, and SAGE III data and products are the responsibility of the LaRC DAAC. Acceptance testing scenarios are used to verify that science software integration support, product QA, data search and order, and data management services are conducted at the SCFs and between the SCFs and ECS. Release B provides new and enhanced functionality to the software developed for the MSFC SCF during the Release A time frame.

10.2.2.1 Test Case B100220.010-LaRC Science Software Installation and Maintenance (SSI&M)

The LaRC Science Software Installation and Maintenance test case verifies by using Test, Analysis, and Inspection methods that the ECS SSI&M personnel provides support in developing and testing algorithms (via E-mail and phone contacts) and QA of produced data products. The science users including PIs generate and transmit a quality report about data products to the appropriate segment of the ECS project.

Using the Demonstration method, a user at the LaRC SCF invokes an icon on the desktop to activate the Advertising Service. A screen appears with a selection of keywords, spatial, temporal and other constraints. Upon entering these parameters, an HTML window is displayed. The user examines and receives algorithms; searches and obtains standard L0-L4 data with corresponding metadata, ancillary data, calibration data and correlative data for use in developing and testing algorithms. The user at the LaRC SCF utilizes EOSView to help analyze algorithm test products, calibrate data, verify parameters and detect anomalies.

10.2.2.2 Test Case B100220.020-LaRC Product QA

The LaRC Product QA test case verifies that a member of the LaRC DAAC is able to view a list of products requiring QA by the SCF's. Using the Test and Analysis methods, a user at the

LaRC SCF transmits a status message to confirm or reject processing order. A list of products are maintained requiring QA by SCF.

Using the Demonstration method, it is verified that a user at the LaRC SCF has the ability to request and receive a product and its associated metadata from the ECS for QA, interface with ECS QA personnel for product QA support (via E-mail and phone contacts) and send QA reports to the ECS. The user receives product QA information from the SCF which contains the identification of product, QA results and product storage and processing instructions.

10.2.2.3 Test Case B100220.030-LaRC Data Search, Browse, Request, Access and Receive

The LaRC Data Search, Browse, Request, Access and Receive test case verifies that a user at the LaRC SCF searches the ECS for Level 1 (L1) - Level 4 (L4) products and uses the Browse service to view these products. For this test, the focus is on the ability for the SCF user to access data related to pre-launch checkout of the ACRIM, CERES, MISR, MOPITT, and SAGE III instruments. The user utilizes the Data Processing Subsystem software to provide tools to support the preparation or automated generation of directory, inventory, and simulation of an on-line Data Processing Subsystem training session.

Using the Test and Demonstration methods, a user selects the system Advertising Service, which enables the user to choose various constraints: keywords, spatial, temporal, and other constraints. Upon entering these parameters, an HTML window is displayed showing all available services which the user is authorized to access. The user at the LaRC SCF has the ability to request and receive L1-L4 products, browse data, documents, accounting information, unstructured text, binary unstructured data, binary sequential data and sequential text. A user constructs the requests for Data Management services, forwards the requests to the Data Management server, and obtains request results.

A user utilizes the Data Processing Subsystem software to visualize animated product and data (i.e., vector and raster formats). The user generates 2-D, 3-D, and Contour plots and 3-D surface diagrams. Then, the user manipulates (i.e., pan, zoom, color, contrast) the image for statistical analysis. The user at the LaRC SCF interfaces with ECS personnel for support in generating new search services (via E-mail and phone contacts to ECS personnel) that dynamically browse the data and metadata.

10.2.2.4 Test Case B100220.040-LaRC Data Management Services

The LaRC Data Management Services test case verifies by using the Test and Analysis method that the user at the LaRC SCF uses the System Management Subsystem to provide services for metadata management for local SCF metadata. This software also provides local interactive and batch data management to search, add, update, delete, and retrieve metadata. The System Management Subsystem operates the local SCF data base by using an ECS supported DBMS (provided by the SCF) to perform the following administration utilities modifying the data base scheme, monitoring the performance, administering the user access control, and data base backup and recovery.

The System Management Subsystem allows the user to locate and identify desired data without any detailed knowledge of the systems. A user selects data for retrieval by boolean operators, relational operators, attribute values, and a combination thereof from the data base. This test also demonstrates that a user at the LaRC SCF has the ability to use the System Management Subsystem to simulate an on-line training session.

10.2.3 GSFC DAAC-SCF's (MODIS and COLOR) Sequence

The GSFC DAAC-SCF's sequence verifies that the ECS is accessible by users at the GSFC SCF site and other sites supported by the GSFC DAAC. For example, The Science Scenario Model #6 "Sugarland Run Regional Park watershed" by Jerry Garegnani forms the basis for these test cases. Using this Science Scenario, the user tests functionality related to data retrieval and product ordering at this DAAC.

The GSFC performs the following AM-1 Mission operations: ingest MODIS level-0 data products; process, distribute and archive for MODIS and COLOR higher level products. This DAAC also supports Science Software I&M for MODIS and COLOR instruments; archive and distribution of product QA at SCF's and User access; access to V0 data products; Interoperability with new DAAC's and TRMM mission support.

The GSFC DAAC also performs the data archival and distribution functions for the general science community in the areas of climate, meteorology, stratosphere, geophysics, and ocean biology. Acceptance testing scenarios are used to verify that science software integration support, product QA, data search and order, and data management services are conducted at the SCFs and between the SCFs and ECS. MODIS/COLOR data and products are the responsibility of the GSFC DAAC. The interfaces are standardized for each SCF function independent of the SCF's resource configuration.

10.2.3.1 Test Case B100230.010-GSFC Science Software Installation and Maintenance (SSI&M)

The GSFC Science Software Installation and Maintenance test case verifies by using Test, Analysis, and Inspection methods that the ECS SSI&M personnel provides support in developing and testing algorithms (via E-mail and phone contacts) and QA of produced data products. The science users including PIs generate and transmit a quality report about data products to the appropriate segment of the ECS project.

Using the Demonstration method, a user at the GSFC SCF invokes an icon on the desktop to activate the Advertising Service. A screen appears with a selection of keywords, spatial, temporal and other constraints. Upon entering these parameters, an HTML window is displayed. The user examines and receives algorithms; searches and obtains standard L0-L4 data with corresponding metadata, ancillary data, calibration data and correlative data for use in developing and testing algorithms. The user at the GSFC SCF utilizes EOSView to help analyze algorithm test products, calibrate data, verify parameters and detect anomalies.

10.2.3.2 Test Case B100230.020-GSFC Product QA

The GSFC Product QA test case verifies that a member of the GSFC DAAC is able to view a list of products requiring QA by the SCF's. Using the Test and Analysis methods, a user at the GSFC SCF transmits a status message to confirm or reject processing order. A list of products are maintained requiring QA by the SCF.

Using the Demonstration method, it is verified that a user at the GSFC SCF has the ability to request and receive a product and its associated metadata from the ECS for QA, interface with ECS QA personnel for product QA support (via E-mail and phone contacts) and send QA reports to the ECS. The user receives product QA information from the SCF which contains the identification of product, QA results and product storage and processing instructions. The ECS has the ability to append the quality reports to the associated archived data products.

10.2.3.3 Test Case B100230.030-GSFC Data Search, Browse, Request, Access and Receive

The GSFC Data Search, Browse, Request, Access and Receive test case verifies that it is possible for a user at the GSFC SCF to search the ECS for Level 1 (L1) - Level 4 (L4) products and uses the Browse service to view these products. For this test, the focus is on the ability for the SCF user to access data related to pre-launch checkout of the MODIS and COLOR instruments. The user utilizes the Data Processing Subsystem software to provide tools to support the preparation or automated generation of directory, inventory, and simulation of an Data Processing Subsystem training session.

Using the Test and Demonstration methods, a user selects the system Advertising Service, which enables the user to choose various constraints: keywords, spatial, temporal, and other constraints. Upon entering these parameters, an HTML window is displayed showing all available services which the user is authorized to access. The user at the GSFC SCF has the ability to request and receive L1-L4 products, browse data, documents, accounting information, unstructured text, binary unstructured data, binary sequential data and sequential text. A user constructs the requests for Data Management services, forwards the requests to the Data Management server, and obtains request results.

A user utilizes the Data Processing Subsystem to visualize animated product and data (i.e., vector and raster formats). The user generates 2-D, 3-D, and Contour plots and 3-D surface diagrams. Then, the user manipulates (i.e., pan, zoom, color, contrast) the image for statistical analysis. The user at the GSFC SCF interfaces with ECS personnel for support in generating new search services (via E-mail and phone contacts to ECS personnel) that dynamically browse the data and metadata.

10.2.3.4 Test Case B100230.040-GSFC Data Management Services

The GSFC Data Management Services test case verifies by using the Test and Analysis method that the user at the GSFC SCF uses the System Management Subsystem software to provide services for metadata management for local SCF metadata. This software also provides local interactive and batch data management to search, add, update, delete, and retrieve metadata. The

System Management Subsystem software operates the local SCF data base by using an ECS supported DBMS (provided by the SCF) to perform the following administration utilities modifying the data base scheme, monitoring the performance, administrating the user access control, and data base backup and recovery.

The System Management Subsystem software allows the user to locate and identify desired data without any detailed knowledge of the systems. A user selects data for retrieval by boolean operators, relational operators, attribute values, and a combination thereof from the data base. This test also demonstrates that a user at the GSFC SCF has the ability to use the System Management Subsystem software to simulate an on-line training session.

10.2.4 JPL DAAC-SCF's (SeaWinds, MR and DFA) Sequence

The JPL DAAC-SCF's sequence verifies that the ECS is accessible by a user at the JPL SCF. For example, The Science Scenario Model #16 "Southern Ocean Large Scale Circulation" by Leonard Walstad collected and written by Tess Wingo of the ECS Science Office forms the basis for the test cases. Using this Science Scenario, the user tests functionality related to data retrieval and product ordering at this DAAC.

The JPL DAAC performs the following AM-1 Mission operations: ingest SeaWinds/DFA/MR level-0 data products; process, distribute and archive for SeaWinds/DFA/MR higher level products. This DAAC also supports Science Software I&M for SeaWinds/DFA/MR instruments; access and distribution of product QA at SCF's and User access; Interoperability with other DAAC's and access to V0 data products.

The JPL DAAC also performs the data archival and distribution functions for the general science community in the areas of physical oceanography. SeaWinds, MR and DFA data and products are the responsibility of the JPL DAAC. Acceptance testing scenarios are used to verify that science software integration support, product QA, data search and order, and data management services are conducted at the SCFs and between the SCFs and ECS. SeaWinds/DFA/MR data and products are the responsibility of the JPL DAAC. The interfaces are standardized for each SCF function independent of the SCF's resource configuration.

10.2.4.1 Test Case B100240.010-JPL Science Software Installation and Maintenance (SSI&M)

The JPL Science Software Installation and Maintenance test case verifies by using Test, Analysis, and Inspection methods that the ECS SSI&M personnel provides support in developing and testing algorithms (via E-mail and phone contacts) and QA of produced data products. The science users including PIs generate and transmit a quality report about data products to the appropriate segment of the ECS project.

Using the Demonstration method, a user at the JPL SCF invokes an icon on the desktop to activate the Advertising Service. A screen appears with a selection of keywords, spatial, temporal and other constraints. Upon entering these parameters, an HTML window is displayed. The user examines and receives algorithms; searches and obtains standard L0-L4 data with corresponding metadata, ancillary data, calibration data and correlative data for use in developing

and testing algorithms. The user at the JPL SCF utilizes EOSView to help analyze algorithm test products, calibrate data, verify parameters and detect anomalies.

10.2.4.2 Test Case B100240.020-JPL Product QA

The JPL Product QA test case verifies that a member of the JPL DAAC is able to view a list of products requiring QA by the SCF's. Using the Test and Analysis methods, a user at the JPL SCF transmits a status message to confirm or reject processing order. A list of products are maintained requiring QA by the SCF.

Using the Demonstration method, it is verified that a user at the JPL SCF has the ability to Request, Access receive a product and its associated metadata from the ECS for QA, interface with ECS QA personnel for product QA support (via E-mail and phone contacts) and send QA reports to the ECS. The user receives product QA information from the SCF which contains the identification of product, QA results and product storage and processing instructions. The ECS has the ability to append the quality reports to the associated archived data products.

10.2.4.3 Test Case B100240.030-JPL Data Search, Browse, Request, Access and Receive

The JPL Data Search, Browse, Request, Access and Receive test case verifies that a user at the JPL SCF searches the ECS for Level 1 (L1) - Level 4 (L4) products and uses the Browse service to view these products. For this test, the focus is on the ability for the SCF user to access data related to pre-launch checkout of the SeaWinds, MR and DFA instruments. The user utilizes the Data Processing Subsystem software to provide tools to support the preparation or automated generation of directory, inventory, and simulation of an Data Processing Subsystem training session.

Using the Test and Demonstration methods, a user selects the system Advertising Service, which enables the user to choose various constraints: keywords, spatial, temporal, and other constraints. Upon entering these parameters, an HTML window is displayed showing all available services which the user is authorized to access. The user at the JPL SCF has the ability to request and receive L1-L4 products, browse data, documents, accounting information, unstructured text, binary unstructured data, binary sequential data and sequential text. A user constructs the requests for Data Server Subsystem services, forwards the requests to the Data Server Subsystem server, and obtains request results.

A user utilizes the Data Processing Subsystem data visualization to visualize animated product and data (i.e., vector and raster formats). The user generates 2-D, 3-D, and Contour plots and 3-D surface diagrams. Then, the user manipulates (i.e., pan, zoom, color, contrast) the image for statistical analysis. The user at the JPL SCF interfaces with ECS personnel for support in generating new search services (via E-mail and phone contacts to ECS personnel) that dynamically browse the data and metadata.

10.2.4.4 Test Case B100240.040-JPL Data Management Services

The JPL Data Management Services test case verifies by using the Test and Analysis method that the user at the JPL SCF uses the System Management Subsystem software to provide services for metadata management for local SCF metadata. This software also provides local interactive and batch data management to search, add, update, delete, and retrieve metadata. The System Management Subsystem software operates the local SCF data base by using an ECS supported DBMS (provided by the SCF) to perform the following administration utilities modifying the data base scheme, monitoring the performance, administering the user access control, and data base backup and recovery.

The System Management Subsystem software allows the user to locate and identify desired data without any detailed knowledge of the systems. A user selects data for retrieval by boolean operators, relational operators, attribute values, and a combination thereof from the data base. This test also demonstrates that a user at the JPL SCF has the ability to use the Data Processing Subsystem software to simulate an on-line training session.

10.2.5 EDC DAAC-SCF's (MODIS and ASTER) Sequence

The EDC DAAC-SCF's sequence verifies that the ECS is accessible by a user at the EDC SCF. For example, The Science Scenario Model #8 "Global Carbon Modeling: Study of Biomass Burning" by Chris Justice collected and written by Tess Wingo of the ECS Science Office forms the basis for these test cases. Using this Science Scenario, the user tests functionality related to data retrieval and product ordering at this DAAC. This sequence will be modified later to test pull functionality related to MODIS products at NSIDC DAAC.

The EDC DAAC supports the following AM-1 Mission operations: ingest MODIS data products from GSFC and ASTER level-1 data from ASTER GDS; process, distribute and archive for MODIS and ASTER higher level products. This DAAC also supports Landsat-7 Mission; access and distribution of product QA at SCF's and User access; Interoperability with new DAAC's and access to V0 data products.

The EDC DAAC also performs data archival and distribution functions for the general science community in the areas related to land processing. Acceptance test scenarios are used to verify science software integration support, product QA, data search and order, and data management services are conducted at the SCFs and between the SCFs and ECS. MODIS/ASTER data and products are the responsibility of the EDC DAAC. The interfaces are standardized for each SCF function independent of the SCF's resource configuration.

10.2.5.1 Test Case B100250.010-EDC Science Software Installation and Maintenance (SSI&M)

The EDC Science Software Installation and Maintenance test case verifies by using the Test, Analysis, and Inspection methods that the ECS SSI&M personnel provides support in developing and testing algorithms (via E-mail and phone contacts) and QA of produced data products. The science users including PIs generate and transmit a quality report about data products to the appropriate segment of the ECS project.

Using the Demonstration method, a user at the EDC SCF invokes an icon on the desktop to activate the Advertising Service. A screen appears with a selection of keywords, spatial, temporal and other constraints. Upon entering these parameters, an HTML window is presented to the user. Then, user has the ability to examine and receive algorithms; search and obtains standard L0-L4 data with corresponding metadata, ancillary data, calibration data and correlative data for use in developing and testing algorithms. The user at the EDC SCF utilizes EOSView to help analyze algorithm test products, calibrate data, verify parameters and detect anomalies.

10.2.5.2 Test Case B100250.020-EDC Product QA

The EDC Product QA test case verifies that a member of the EDC DAAC is able to view a list of products requiring QA by the SCF's. Using the Test and Analysis methods, a user at the EDC SCF transmits a status message to confirm or reject processing order. A list of products are maintained requiring QA by the SCF.

Using the Demonstration method, it is verified that a user at the EDC SCF has the ability to request and receive a product and its associated metadata from the ECS for QA, interface with ECS QA personnel for product QA support (via E-mail and phone contacts) and send QA reports to the ECS. The user receives product QA information from the SCF which contains the identification of product, QA results and product storage and processing instructions. The ECS has the ability to append the quality reports to the associated archived data products.

10.2.5.3 Test Case B100250.030-EDC Data Search, Browse, Request, Access and Receive

The EDC Data Search, Browse, Request, Access and Receive test case verifies that a user at the EDC SCF searches the ECS for Level 1 (L1) - Level 4 (L4) products and uses the Browse service to view these products. For this test, the focus is on the ability for the SCF user ASTER GDS to access data related to pre-launch checkout of the MODIS and ASTER instruments. The user utilizes the Data Processing Subsystem software to provide tools to support the preparation or automated generation of directory, inventory, and simulation of an Data Processing Subsystem training session.

Using the Test and Demonstration methods, a user selects the system Advertising Service, which enables the user to choose various constraints: keywords, spatial, temporal, and other constraints. Upon entering these parameters, an HTML window is displayed showing all available services which the user is authorized to access. The user at the EDC SCF has the ability to request and receive L1-L4 products, browse data, documents, accounting information, unstructured text, binary unstructured data, binary sequential data and sequential text. A user constructs the requests for Data Server Subsystem services, forwards the requests to the Data Server Subsystem server, and obtains request results.

A user utilizes the Data Processing Subsystem data visualization to visualize animated product and data (i.e., vector and raster formats). The user generates 2-D, 3-D, and Contour plots and 3-D surface diagrams. Then, the user manipulates (i.e., pan, zoom, color, contrast) the image for statistical analysis. The user at the EDC SCF interfaces with ECS personnel for support in

generating new search services (via E-mail and phone contacts to ECS personnel) that dynamically browse the data and metadata.

10.2.5.4 Test Case B100250.040-EDC Data Management Services

The EDC Data Management Services test case verifies by using the Test and Analysis method that the user at the EDC SCF uses the System Management Subsystem software to provide services for metadata management for local SCF metadata. This software also provides local interactive and batch data management to search, add, update, delete, and retrieve metadata. The System Management Subsystem software operates the local SCF data base by using an ECS supported DBMS (provided by the SCF) to perform the following administration utilities modifying the data base scheme, monitoring the performance, administrating the user access control, and data base backup and recovery.

The System Management Subsystem software allows the user to locate and identify desired data without any detailed knowledge of the systems. A user selects data for retrieval by Boolean operators, relational operators, attribute values, and a combination thereof from the data base. This test also demonstrates that a user at the EDC SCF has the ability to use the Virtual System Management Subsystem software to simulate an on-line training session.

10.3 Interdisciplinary/Inter-DAAC Science Scenario

The Interdisciplinary/Inter-DAAC Science Scenario verifies that the ECS provides the capability for interdisciplinary science and socio-economic researchers to search, access, and view ECS and non-ECS data at multiple ECS DAACs, V0 DAACs, the SEDAC, and the NOAA ADC.

This scenario uses CERES (LaRC), MODIS (EDC), MISR (LaRC), and ASTER (EDC) data from ECS DAAC's, NMC (NOAA ADC) and Atmospheric Radiation Measurement (ARM) (insitu data from V0). The following paragraph describe the Interdisciplinary/Inter-DAAC Science Scenario in greater detail.

The examples of Interdisciplinary/Inter DAAC science scenarios are as follows: Science Scenario #3 "Test ecological theory regarding vegetation competition in grasslands across the central U.S." written by Don Strebel and collected by Celeste Jarvis forms the basis for the test cases. Using this Science Scenario, the users find data to test theory by their own analysis. Science Scenario #4 "International researcher (Scotland) developing Forest Model" written by Andrew Friend and collected by Kathryn Neel forms the basis for the test cases. Using this Science Scenario, the users request information via telephone or other contact with EOS Help services on all algorithms associated with forest modeling for comparison with user's model. And, finally the Science Scenario #11A "NSIDC Science Scenario-Sea Ice" written by Dr. John Heinrichs and collected by Celeste Jarvis forms the basis for the test cases. Using this Science Scenario, the user queries to buoy, Ice cores, sub tracks, and meteorological station data. The query is submitted to the client and then user orders when query results are returned.

This scenario is used to verify that an authorized user has the ability to perform cross-DAAC coincident searches, i.e., to request data or products. For example, an authorized user can

construct and execute a query that will return coincident data from multiple DAAC's (cross DAAC coincident searches).

10.3.1 Cross-DAAC Sequence

The Cross-DAAC sequence addresses the user's capabilities to query the system via the ECS Client for data contained in multiple DAACs with a single query. Interoperability between DAACs is demonstrated by the processing of queries that return coincident data from the different DAACs.

A user must be authorized to receive specific data before they access the DAAC data archives. The process of searching and viewing the data holding of the sequence guides the user through the proper steps required for submitting the authentication request. Once access privileges are granted, the user continues to generate queries to search inventory, directory and guide metadata, and to browse particular products from the DAAC archives. The Science User Scenario entitled "Derivation of Snow Water Equivalents (Figure 10-2) collected by Kaminski/Khalsa and written by Tess Wingo of the ECS Science Office is referenced to demonstrate and test this service.

10.3.1.1 Test Case B100310.010-System Access to ECS and Non ECS Users

The System Access to ECS and Non ECS Users test case verifies that the ECS is accessible via direct connection, WAIS or WWW. The Test, Analysis, Inspection and Demonstration methods verify that ECS and Non ECS Users have access via these connections. The user must be authorized to receive data before they access any DAAC data archives.

The authorized user establishes the connection by using telnet address for a specific DAAC or entering URL to the ECS DAACs. Upon successful access to the system, the system launches a login window and prompts the user for their login name and password.

10.3.1.2 Test Case B100310.020-Cross-DAACs Search and Order

The Cross-DAACs Search and Order test case verifies that a user has the ability to construct and execute a query that searches the data holdings of the following DAACs: LaRC, MSFC, GSFC, JPL, EDC, ASF, CIESIN SEDAC, and NOAA ADC. The user receives the correct list of guide data and then queries the system to get inventory data.

This test case uses the Test method to verify that an ECS user requests a product from the DAACs archives. The query is constructed in such a way that causes it to proceed to each of the ECS DAACs. The queries are for data migrated to ECS. For queries going to the V0 system, all query results are the same as query results generated from the V0 Communications Subsystem. For queries sent to ECS DAAC(s), query results are compared to a list of datasets (along with associated guide and browse data, documentation and algorithms) to verify that queries returned the correct results for each ECS DAAC.

The user then reviews the results of these queries and orders them from the DAACs. This test case verifies that the DAACs send the product directly to the authorized user either on physical

media or electronically per the user's request. Product requests are verified as being distributed (network and tape) to the user's account used for the test.

10.3.1.3 Test Case B100310.030-Cross-DAACs Directory

The Cross-DAACs Directory test case verifies that ECS has the capability to provide the user with a collection of uniform descriptions that summarize the contents of a large number of data sets. The information provided assists the user in determining the existence and contents of the data sets.

The Science User Scenario entitled "Derivation of Snow Water Equivalents (Figure 10-2) collected by Kaminski/Khalsa and written by Tess Wingo of the ECS Science Office is referenced to demonstrate and test this service. After corresponding with the ECS help desk, who directs the user to the SSM/I gridded brightness temperature data, the Demonstration method is used to verify that the user queries the directory for SSM/I gridded brightness temperature data using "SSM/I" as the keyword for the search criteria.

The system responds to the user with an informational message stating that the query is being executed and provides a listing of the directory information that relates to the request.

10.3.1.4 Test Case B100310.040-Cross-DAACs Guide

The Cross-DAACs Guide test case verifies that ECS has the capability to provide the user with a detailed (document) description of a number of data sets and related entities. This document contains information suitable for making a determination of the nature of each data set and its potential usefulness for a specific application. This service provides detailed information on whole data sets and related entities as a user aid in selecting and using data.

The Science User Scenario entitled "Derivation of Snow Water Equivalents" (Figure 10-2) is referenced to demonstrate and test this service. The Demonstration method is used to verify that ECS provides the user with on-line guide (documentation/reference material) that provides information about individual EOSDIS data sets. This functionality is tested by searching for the availability of guide information for data set and data product names for products associated with SSM/I gridded brightness temperature.

The user specifies the following parameters to locate the guide information: 5 year period (1987 - 1991 North of 30 degrees N), and "SSM/I" as the keyword. The system responds to the user with an informational message stating that the query is being executed and provides a listing of < 25 hits of guide information that relates to the requests.

10.3.1.5 Test Case B100310.050-Cross-DAACs Inventory

The Cross-DAACs Inventory test case verifies that ECS has the capability to provide the user with information that describes each granule of EOSDIS data. The primary use of this service is to view local, regional, or global product searches, returning enough information in the results to identify specific granules and allow further investigation (such as requests for browse products, production history, QA statistics), or to determine that the granules are suitable for access.

The Demonstration and Analysis methods are used to verify that ECS provides the capability to search the data inventory which describes each granule of EOSDIS data. This test case verifies that ECS provides interactive support including extensive prompting and help utilities.

The Science User Scenario entitled "Derivation of Snow Water Equivalents" (Figure 10-2) is referenced to demonstrate and test this service. Using "SSM/I" as the keyword for the search criteria, the user queries the inventory for data sets. The system responds to the user with an informational message stating that the query is being executed and provides a listing of 25 - 75 hits for guide information are returned.

10.3.1.6 Test Case B100310.060-Cross-DAACs Browse

The Cross-DAACs Browse test case verifies that ECS allows the user to prescreen individual products before ordering, or possibly to perform correlative viewing of multiple sources to aid in the selection of product order. The Demonstration method is used to verify that ECS provides the capability to visualize pre-order data products and metadata (e.g., coverage maps, summary data) to facilitate the data selection and ordering process.

The Science User Scenario entitled "Derivation of Snow Water Equivalents" (Figure 10-2) is referenced to demonstrate and test this service. To locate the data sets, the user submits a query for Level 3 SSM/I gridded brightness temperature browse data for the northern hemisphere (see the scenario in Figure 10-2).

After selecting and reading the result of the request, the Demonstration method is used to verify that ECS provides the capability for the user to browse Level 3 SSM/I gridded brightness temperature browse data.

10.3.2 CIESIN/SEDAC and NOAA ADC Sequence

The CIESIN/SEDAC and NOAA ADC Sequence confirms the socio-economic researcher's capabilities to access CIESIN SEDAC or NOAA ADC. The authorized researcher's query searches the CIESIN SEDAC or NOAA ADC data holding for the requested information.

This sequence verifies the user's ability to establish communication with CIESIN/SEDAC or NOAA ADC and access; search and view pertinent information. The user has the ability to request the following data services: inventory data, guide and browse searches; product request; product generation request; product delivery status information; algorithm packages; and documents.

This sequence also confirms it's possible for authorized users to query the system and search the archives of the different DAACs. The user queries CIESIN/SEDAC and NOAA ADC for the requested information. The Science Scenario Model #10b "validation of Cloud Properties with Field data" by Bruce Wielicki forms the basis of the test cases for this sequence.

10.3.2.1 Test Case B100320.010-System Access to CIESIN SEDAC or NOAA ADC

The System Access to CIESIN SEDAC or NOAA ADC test case verifies that ECS is accessible via direct connection, WAIS or WWW. The Demonstration, Test, and Analysis methods are

used to verify that CIESIN SEDAC or NOAA ADC client has the ability to guide, browse, and search requirements.

The user must be authorized to receive data before they have access any DAAC data archives. The authorized user uses a telnet address for a specific DAAC to establish the connection or enters a URL to the ECS DAACs. When the user logs onto the system, the system verifies the ECS user's level of security after specific parameters for services is entered. Once the level of security is established, the test case verifies the ECS user has the ability to access the CIESIN SEDAC and NOAA ADC from the ECS.

This test case verifies that the ECS user's request for information is sent successfully to the CIESIN SEDAC and NOAA ADC and that the requested information is received by the ECS user from the CIESIN SEDAC and NOAA ADC. The user's requests take the form of guide, inventory and/or browse requests. The user receives a displayed list for each query under the parameter established by the user when requesting the information.

In addition, the user may query the system for a product availability list or the user may request the availability of a specific product. The user receives either the product availability list on the screen or the single specific request.

10.3.2.2 Test Case B100320.020-User Search

The User Search test case verifies the ECS user's ability to construct and execute queries that search both the ECS and the NOAA ADC archives. The Demonstration, Test, and Analysis methods are used to verify that the queries are sent and the ECS user receives the correct data from the NOAA ADC and ECS archives. The data is displayed on screen and the user may browse the data.

The ECS user queries the system for a product that will search both the ECS archives and the NOAA ADC archives. The user receives the requested data on-line.

10.3.2.3 Test Case B100320.030-User Request CIESIN/SEDAC and NOAA ADC Products

The User Request CIESIN/SEDAC and NOAA ADC Products test case verifies that the ECS user's request for SEDAC and NOAA ADC products is sent to ECS Users. The Demonstration, Test and Analysis methods are used to verify product request requirements. This test case also verifies that the ECS user receives the requested products, including products requested as ancillary data followed by the data availability schedule and the data availability notification. The L0-L4 equivalent data sets, calibration data, documents, algorithms, correlative data, and ancillary data products are accessible to the ECS user.

The guide query provides the user with a detailed description of a number of data sets and related entities. Once the user decides on the product, the user is able to order the information. The system sends an acknowledgment of the product request. The user is notified of the data arrival via a notice received in the user's message box.

10.3.2.4 Test Case B100320.040-Product Status Request

The Product Status Request test case verifies the user's ability to request product delivery status after the product has been requested. The Demonstration, Test, and Analysis methods are used to verify the ECS user's product delivery status request requirements. This test case verifies that the product delivery status request is sent to the NOAA ADC and CIESIN SEDAC and that product delivery status is received by an user.

Once a product has been ordered, the user may inquire on the status of the product on-line. The user receives the status of the requested product on line. The status message notifies the user of the product's status.

10.4 Alaska SAR Facility (ASF) DAAC Data Access Scenario

The ASF poses a special case due to the DAAC unique interfaces between the ECS and non-ECS systems, with the ASF DAAC Unique facility providing the processing and the ECS system the archive for a number of radar products (Instruments on the following: European ERS-1, ERS-2, Japanese JERS-1, Canadian RADARSAT). For this reason, the ASF is detailed in this separate scenario. The following paragraphs describe the scenario in greater detail.

This scenario verifies that the ASF ECS DAAC provides the capability for authorized users to perform the following: search, access, and view ECS and Version 0 (V0) data stored at the ASF DAAC Unique system, and access ADC/ODC data (via the ASF ECS DAAC).

For an authorized science user who is thoroughly familiar with the system and has already registered with ECS, the ASF ECS DAAC provides ready access to the following ECS services: information search, user feedback information, ECS client operations information, and Applications Programming Interfaces (APIs).

This scenario confirms authorized user access to raw instrument science data (from ERS-1, ERS-2, JERS-1, and RADARSAT), which is cataloged by ASF ECS DAAC at the ASF DAAC Unique facility, and the associated products, which are generated by ASF DAAC Unique portions of the ASF ECS DAAC. Providing SAR products to the user verifies the capability of the ASF ECS DAAC to interface with the product generation portion of the ASF DAAC Unique facility. The ASF ECS DAAC transfers user requests to the product generation portion of the ASF DAAC Unique facility and subsequently receives the products requested for transmission to the user.

The capability for an authorized ECS user to search, access, and view data holdings archived in the V0 portion of the ASF ECS DAAC is confirmed. The ECS user identifies the V0 data of interest using the ECS Advertising Service, which provides search and order services for accessing V0 data holdings.

Similarly, this scenario confirms that an ECS science user has the ability to search, access, and view pertinent NOAA ADC data holdings. Accessing these data holdings verifies the ECS user's capability to order data products, algorithm packages, and documents; initiate standing orders; and request status for previous orders.

10.4.1 ASF Instruments Product Data Sequence

The ASF Instruments Product Data Sequence confirms that an authorized user has access to ERS-1, ERS-2, JERS-1 and RADARSAT data and products. Raw signal SAR data is cataloged by ASF ECS DAAC and CSA and then made available to authorized users. Request for raw signal SAR data from the CSA catalog must go through the ASF ECS DAAC. The user has the capability to request High Resolution Level 1 products via the catalog of raw data. High resolution products are produced only upon user request. ASF ECS DAAC sends the request to ASF DAAC Unique production system which reads the raw data and generates the product. Once the product has been generated ASF DAAC Unique sends the requested product back to ASF ECS DAAC who in turn distributes it to the requesting user. The product is cataloged and held by ASF ECS DAAC in temporary storage for 30 days before it is purged from the system. The following test cases verify the users' capabilities to browse the catalogs; to send the user requests to ASF DAAC Unique; to receive the generated product; and to distribute the product to the user.

Unlike High Resolution Level 1 products, Low Resolution Level 1 products can also be requested, but they are cataloged and archived permanently. Level 2 and geophysical products can be requested from the catalog of those products. The products are generated on demand and are archived by ASF ECS DAAC and can then be requested directly. The test cases verify that the user has access to browse capabilities for specific product catalogs and can request the product. The test cases also verify ASF ECS DAAC's ability to receive the user requests for Level 2 and geophysical products (high-level data products to support sea ice and ocean investigations using Synthetic Aperture Radar (SAR) data processed and archived at the Alaska SAR Facility) and has the capability to distribute the requested product to the user.

These test cases also verify the capability of an authorized science user to be provided ready access to the following ECS services: information search, user feedback information, ECS client operations information, and Applications Programming Interfaces (APIs).

10.4.1.1 Test Case B100410.010-Browse SAR Products and Data Catalog

The Browse SAR Products and Data Catalog test case verifies the capability of ECS users to visualize pre-order SAR data products and metadata. This test case also verifies the ability of the ECS users to conduct data searches and browse the ASF ECS DAAC and CSA portions of the ASF DAAC through the ASF ECS DAAC and the CSA catalogs of raw SAR data and products. The products, once requested from either catalog, are generated by the ASF DAAC Unique facility and held by ASF ECS DAAC in temporary storage for 30 days so that the requester can retrieve them before they are purged from the system. This test case also verifies that ECS personnel at the ASF ECS DAAC support science user development of new search methods that dynamically browse the data and metadata, and use the browse service to view those products. The Analysis and Demonstration methods are used to show that ECS users have the capability to visualize pre-order data products and metadata (e.g., coverage maps, summary data) at the ASF ECS DAAC to facilitate the data selection and ordering process. The Science User Scenario #12 entitled "GCM Researcher Mid-Latitude and Tropical Interactions-Precipitation Forcing Scenario" is referenced to demonstrate and test this service.

To locate the data sets, the ECS user submits a query for drainage basin boundary data, digital elevation model, inundation, extent from the flood plain map, and major stream channels browse data for an area of 600 square kilometers. After selecting and reading the result of the request, the Demonstration method is used to verify that ASF ECS DAAC provides the capability for the ECS user to browse drainage basin boundary data, inundation, extent from the flood plain map, and major stream channels browse data for an area of 600 square kilometers. The Analysis method is used to verify the capability of an ECS user to interface with ASF ECS DAAC personnel at the ASF DAAC for support in generating new search services that dynamically browse the data and metadata.

10.4.1.2 Test Case B100410.020-Request SAR Data and Products

The Request SAR Data and Products test case verifies the capability of ECS users to submit product requests for SAR raw signal and ancillary data, Level 1, 2, 3, and film products to the ASF DAAC Unique facility. This test case also verifies that the ASF ECS DAAC and the ASF DAAC Unique facility send queries and status's on pending requests. Here the request is processed and data retrieved from the archive (processing of ASF products is only accomplished after an on-demand request for a product has been received). After retrieving the data, the ASF DAAC Unique facility sends the data back to ASF ECS DAAC. From here the data is distributed to the ECS users who initially requested it. This test case also verifies that after the 'request for retrieval' has been received, the ASF ECS DAAC provides users with staging status of the request.

The Demonstration and Test methods are used to show that ECS users send product requests for SAR raw signal and ancillary data, Level 1, 2, 3, and film products to the ASF DAAC Unique facility and that the ASF ECS DAAC provides ECS users with staging status of the request.

10.4.1.3 Test Case B100410.030-Distribute SAR Data and Products

The Distribute SAR Data and Products test case verifies the capability of the ASF ECS DAAC to distribute SAR raw signal data (via hard media) and metadata (via catalog), ancillary data, Level 1, 2, 3, and film products and metadata, and quicklook data and metadata to ECS users. The Test and Demonstration methods are used to verify that ECS distributes data and products from the ASF DAAC Unique facility to ASF ECS DAAC for catalog and distribution. The Test and Demonstration methods are also used to verify that the ASF ECS DAAC distributes the data in approved standard formats. The ASF ECS DAAC sends distribution status to the ECS user requesting the data (in response to distribution status requests from the ECS user), and automatically sends data distribution status to the ECS user upon completion of the distribution process.

The Demonstration method also verifies the ability of the ASF ECS DAAC to distribute data and information on-line (i.e., over a network), off-line (hard copy or data media), and electronically over approved high density storage devices under a multi-level priority system via networks and facsimile. During distribution the ASF ECS DAAC operator also verifies by demonstration, the manual override capability of the ASF ECS DAAC that is used to alter the priority of a distribution request. Finally, the Demonstration method is used to verify that the Data

Management Subsystem provides the capability for ECS users to determine the amount of data expected to be returned as the result of the product order and provide the information to the requester.

The results of this test are as follows: the requester of the SAR data receives status messages upon request, listings of expected data to be returned from their requests, and status completion messages from the ASF ECS DAAC upon distribution completion. The requester also receives data in approved ECS formats, once the distribution priority order has been met.

10.4.1.4 Test Case B100410.040-Request CSA SAR Products and Data

The Request CSA SAR Products and Data test case verifies the capability of ECS users to submit production job requests using the CSA catalog listing of available data and products. This test case also verifies that the ASF ESC DAAC and the ASF DAAC Unique facility send queries and status's on pending requests. An ECS user submits a production job request to the ASF ECS DAAC for CSA catalog data or products. The production job request is forwarded to CSA from the ASF DAAC Unique facility. From here the data is retrieved from the CSA archive and sent back to the ASF DAAC Unique facility where the production job request is processed (processing of ASF products is only accomplished after an on-demand request for a product has been received). Next, the ASF DAAC Unique facility sends the processed data or products to the ASF ECS DAAC for distribution. The ASF ECS DAAC then distributes the data to the ECS users who initially requested it. This test case also verifies that after the 'request for retrieval' has been received, the ASF ECS DAAC provides users with staging status of the request.

The Demonstration and Test methods are used to show that ECS users send production job requests for CSA SAR products and data to the ASF ECS DAAC and that the ASF ECS DAAC provides users with staging status of the request. Upon completion of this test the ECS user who submitted the request for data from the CSA catalog receives their desired data or products. The requesting user also receives any status messages generated during processing of their request.

10.4.1.5 Test Case B100410.050-Distribute CSA SAR Products and Data

The Distribute CSA SAR Products and Data test case verifies the capability of the ASF DAAC to distribute CSA generated SAR products and data to ECS users. The Test and Demonstration methods are used to show that ASF ECS DAAC distributes SAR products and data from CSA, after processing by the ASF DAAC Unique facility, to ECS users. The Test and Demonstration methods are also used to verify that the ASF ECS DAAC distributes the CSA SAR products, data, and statistical and accounting information in approved formats including HDF, sends distribution status to the ECS user requesting the data (in response to distribution status requests from the ECS user), and automatically sends data distribution status to the ECS user upon completion of the distribution process.

Also verified by the Demonstration method is the ability of the ASF ECS DAAC to distribute data under a multi-level priority system, the ability of the operator at the ASF ECS DAAC to conduct a manual override of the distribution in order to alter the priority of a distribution request.

The Demonstration method is used to verify that it is possible for the ASF ECS DAAC to transfer products and subsetting, subsampled, or summary data to the requester, distribute data based upon entries in the order distribution list, provide the capability to distribute information on-line (i.e., over a network), off-line (hard copy or off-line data media), electronically using a variety of approved high density storage media (such as: 8 mm tape, 4 mm DAT, 3480/3490 tape, CD ROM, and 6250 tape), and via networks and FAX.

Finally, the Demonstration method is used to verify that the Data Management Subsystem provides the capability for ECS users to generate and update requests for orders from the ASF ECS DAAC and to distribute CSA archive holdings to include, at a minimum, standard products, standard product software, EOC historical data, spacecraft housekeeping and ancillary data, engineering data and determine the amount of data expected to be returned as the result of the product order and provide the information to the requester.

10.4.1.6 Test Case B100410.060-Application Programming Interfaces

The Application Programming Interfaces test case verifies that ECS provides configuration-controlled Application Programming Interfaces (API's) that are capable of supporting development of extensions to the ECS Client and the data archive system by the DAACs.

Since the DAACs have just received the software, it is not expected that any of the API's have been used, and no actual DAAC extensions are in place. Instead, the Acceptance Test Team uses the Inspection method to prove that the API's are part of the Release and are utilized to build the following user interface extensions: a) Addition of metadata fields that are unique to the DAAC; b) Addition of documents for use as guide metadata; c) Support of data visualization utilities; d) Support of DAAC-specific data analysis utilities; e) Development of DAAC-unique metadata searching and services; f) Development of a local user interface. For the data archive system these API's are utilized to develop DAAC unique data distribution services and a custom operator interface.

The expected results of this test are that the software is present at each DAAC in the correct directories, along with the software and manuals giving directions on how to use the software. The Demonstration, Analysis, and the Test methods are used to verify this test.

10.4.1.7 Test Case B100410.070-ECS Client Operations

The ECS Client Operations test case verifies requirements that relate to data base administration, data base maintenance, communication services, ECS resources history and ECS operations summaries for the ECS client.

The Demonstration method is used to show that ECS provides data base administration utilities for modifying the data base schema, performance monitoring, administration of user access control, on-line incremental backup, on-line recovery, and export/import of data. The Demonstration method is also used to show that ECS provides the capability to restructure the database and interrupt a maintenance session and restart the session without loss of information.

The Demonstration method is used to show that ECS provides its users with the following communication services: file transfer, multimedia mail, and electronic bulletin board. To test

this functionality, the ECS operator performs a series of commands. These include transferring files to the user and utilizing the electronic mailing system. The expected results for this test are successful manipulation of the listed communication services.

The Test method is used to show that ECS client at ASF ECS DAAC provides the SMC with a full and complete history of ECS resources used by science investigators, which includes CPU utilization, amount of user storage, connect time, and session histories. Using the information recorded by the system from previous tests as input, the SMC requests a history of ECS resources used by science investigators. The system responds by notifying the SMC via electronic mail that the information was sent successfully. This information is distributed to the SMC on-line (i.e. over the network) using the file transfer protocol (ftp). While executing this test, the Demonstration method is also used to determine the capability for ECS to distribute reports on a periodic basis to a pre-defined list of report recipients on-line, and off-line by paper or electronic media. These reports include: backlog of data distribution request, processing request, data quality assessment, and ECS performance summaries.

10.4.2 ASF/ECS V0 Interface Sequence

The ASF/ECS V0 interface sequence confirms accessibility by authorized users to V0 data holdings of the ASF DAAC. This sequence verifies the user can access the ASF advertising services provided by ECS. Through the advertising service, the user can locate the necessary data via information search and submit a request. This sequence verifies the ECS receives the request and directs the request to the ASF ECS DAAC. The data is retrieved and ASF sends the requested data to ECS.

An ASF ECS DAAC user can also access ECS data holdings. The authorized user would browse through the Advertising service and select the desired data. This sequence verifies ECS capability to receive the request and to successfully send the request to the user.

The following test cases verify the ASF and ECS user's ability to access the ASF and ECS advertising services for V0 data; the ability to search the data holdings; the ability to view and to order data.

10.4.2.1 Test Case B100420.010-ECS User Access to Version 0 Data

The ECS User Access to Version 0 test case verifies that ECS provides an Advertising Service interface that allows V0 to identify the data holdings at each DAAC. The Test method is used to show that by using the ECS Advertising Service, the ECS user searches and identifies Version 0 data of interest and provides a 2-way interoperability with the V0 system.

Through the use of a series of queries generated for exchanging data products, browse data requests, metadata, data quality information, research results, and documentation, this test case verifies that an ECS user requests information that is held in Version 0. ECS determines which V0 DAAC system holds this data and passes the request to the specified DAAC Data Server Subsystem Server. The queries (for exchanging data products, browse data requests, metadata, data quality information, research results, and documentation) are passed from ECS to the DAAC Data Server Subsystem Server. Finally, the results of the query are passed from the V0

DAAC(s) to ECS. Query results are the same as query results generated from the V0 Communications Subsystem (this verifies proper translation of the ECS query to V0 protocols).

The requirements verified in this test case support the functionality described in the "Version 0 EOSDIS Information Management System Users Manual", July 1994, science scenarios #1 (Inventory and Guide Searches) and #5 (Inventory and Browse Searches).

10.4.2.2 Test Case B100420.020-ECS User Search for V0 Data

The ECS User Search for V0 Data test case verifies the users' capability to search the data holdings for V0 data. This test case uses the Inspection and Demonstration methods to verify that users at the ASF DAAC support user search and order processes. The Analysis method is used in coordination with the Inspection and Demonstration method to support science user development of new search methods that dynamically search for, order, and browse the data and metadata maintained in the science processing library holdings and use the browse service to view those products. The Analysis method verifies that internal data base management queries are expressed in a standard query language.

The Demonstration method is used to verify that an Communications Subsystem user is provided with an incremental search capability, the capability to search across multiple data sets for coincident occurrences of data and any other attribute(s) of metadata, maintains or provides access to directory entries for all data sets accessible through the Data Management Subsystem search and order service, and searches a directory of information that describes whole EOSDIS, non-EOSDIS, and ADC earth science data sets. The Demonstration method is also used to verify that an Data Management Subsystem user provides the capability to search the data inventory for granules of EOSDIS data, provides the capability to search a products processing history, and provides the ability to access and present (dependent on the user's display device capabilities) guide information derived from suitably structured and plain text documents.

The Test Method verifies that the Communications Subsystem integrates the searching of metadata holdings for identifying information needed to complete a processing request into the request construction and submission process. Once this is completed, the Test method again is used to verify that the Communications Subsystem provides the capability to search metadata holdings for the purpose of identifying the product desired and the input data to be processed.

10.4.2.3 Test Case B100420.030-ECS User View and Order V0 Data and Products

The ECS User View and Order V0 Data and Products test case verifies the capability of ECS users at the ASF DAAC to view and to order V0 data and products. The Test method is used to verify that the ASF ECS DAAC receives standing and retrospective product orders, and changes to standing orders, from the Client Subsystem. This test case uses the Test method to verify that the ASF ECS DAAC accepts updates and cancellations of data order requests.

The Inspection and Demonstration methods are used to verify that the Data Management Subsystem maintains information on the science processing library holdings and provides the capability for users at the ASF ECS DAAC to search for and order science processing library software.

The Demonstration method is used to verify that the Data Management Subsystem maintains or provides access to directory entries for all data sets accessible through the Data Management Subsystem search and order service.

The Demonstration method is used to verify that the Data Management Subsystem Browse function provides the capability to visualize pre-order data products and metadata (e.g. coverage maps, summary data), to facilitate the data selection and ordering process, and provide integrated data order capabilities with metadata search capabilities. Once desired data or products are found using the Browse functions (as tested in Test Case 10.4.1.1) of the ASF ECS DAAC, the Demonstration method is used to verify that the Data Management Subsystem provides the capability to accept, validate, and fill orders from users for periodic delivery of information specified by the Data Management Subsystem. The Test method is used to verify that Data Management Subsystem allows users to formulate a data order based on the inventory core metadata attributes and geophysical parameters and then prepares, for output to other ECS DADS, product orders to retrieve specified data from the archive and distribute that data.

The Test method is used to verify that Data Management Subsystem provides the capability for users to construct and submit standing orders and requests for processing of ECS data by pre-existing processes, which contain at a minimum: requester identification, algorithm input requirements, text description of need for processing, Level 0-4 data set/subset, required time of generation, requested priority for product processing, resulting product type, processing parameters.

The Test method is used to verify that Data Management Subsystem provides the capability for users to construct a product order associated with a product processing order, determines the amount of data expected to be returned as the result of the product order, provides that information to the requester, and accepts changes from the originator, to existing standing orders for data to be processed by the Data Server Subsystem. The Test method is also used to verify that Data Management Subsystem sends a product order, with priority, and suggested start time and completion time to the ECS elements responsible for processing and distributing a product.

The Test method is used to verify that Data Management Subsystem sends a product order to an ADC or an ODC with the identification of the destination DADS and suggested shipping deadline for data required for product processing.

This test case also verifies that the Data Management Subsystem provides a record of all data orders to the SMC for the purposes of maintaining a full and complete history of data orders. After the request for data or products have been filled, the Demonstration and Test methods are used to verify that the receiving DAAC can copy the data into the class of physical media specified in the product order from the Data Server Subsystem and provides the Data Management Subsystem with data order status after the ordered data has been shipped to the user.

The Demonstration and Test methods are used to verify that the Data Server Subsystem provides the capability for users to request subsetted, subsampled, and summary data products, which have been processed by the Data Server Subsystem during the routine production processing and archived at the DADS, whenever associated inventory information is displayed.

The Test method is used to verify that Data Server Subsystem receives standing orders, changes to standing orders, and product requests from the Data Management Subsystem. The Test method is also used to verify that PGS transmits a status message, with a reason for the rejection, to the Data Management Subsystem to confirm or reject a processing order.

10.4.2.4 Test Case B100420.040 - ECS User One-Time Orders

The ECS User One Time Orders test case verifies that ASF ECS DAAC accepts and validates one-time orders from its users requests for ASF ECS DAAC archived data products. This test also verifies that ASF ECS has the capability to generate and update requests for one-time orders from the data archive to distribute archive holdings. The Demonstration method is used to show that the user can order data for a given time span.

At the completion of the test, the data requested by the one-time order is retrieved from the ASF ECS DAAC archive and distributed to the requesting ECS user.

10.4.2.5 Test Case B100420.050 - ECS User Standing Orders

The ECS User Standing Orders test case verifies that ASF ECS DAAC has the capability to generate and update requests for standing orders from the data archive to distribute archive holdings. The Demonstration method is used to show that the user can order the data. This test also verifies that ASF ECS DAAC displays and transfers data based on the request of the user.

At the completion of the test, the data requested by the standing order is retrieved from the ASF ECS DAAC archive and distributed to the requesting ECS user.

10.4.3 ASF/ECS NOAA ADC Interface Sequence

The ASF/ECS NOAA ADC Interface Sequence confirms authorized users have the ability to access NOAA ADC data holdings at the ASF ECS DAAC. The NOAA SAR Communication System (SARCOM) data holdings comprise a limited amount of products. An authorized user's query for NOAA data is not limited to the ASF DAAC, but other available ADC's as well. Through the advertising service, the user can access the NOAA ADC data holdings, view the data, and order products. This sequence verifies the user can request the data product and receives it successfully.

The following test cases verify ECS receives the user request for NOAA ADC data; sends the request to ASF DAAC Unique facility; receives the requested product; and distributes it to the user.

10.4.3.1 Test Case B100430.010-Receipt of User Request for NOAA ADC Data by ECS

The Receipt of User Request for NOAA ADC Data by ECS test case verifies the capability of ECS users to receive requests for metadata, correlative data, documentation, new derived data sets, standing and retrospective product orders, and changes to standing orders from the ASF ECS DAAC. The ASF DAAC Unique facility receives the request for the raw data and

generates the product. Next, the ASF DAAC Unique facility sends the product back to ASF ECS DAAC who then forwards the information to the users.

The Test method is used to show that users at the ASF DAAC Unique facility can receive requests for NOAA ADC Data. At the completion of the test the requesting user receives their requested NOAA ADC data from the ECS.

10.4.3.2 Test Case B100430.020-Send Request for NOAA ADC Data to ASF DAAC Unique Facility

The Send Request for NOAA ADC Data to ASF test case verifies the capability of ECS users to send requests for high resolution (L0-L4) products, metadata, ancillary, calibration, and correlative data, documentation, planning and scheduling information, software problem reports, browse data, archived data, accounting information, and algorithms to the ASF DAAC Unique facility. The ASF ECS DAAC receives the request for data and forwards the requests to the ASF DAAC Unique facility where the requests are processed. The ASF DAAC Unique facility receives the request and retrieves the raw data required to generate the requested product(s) and generates the product. This test case also verifies that after the request has been received, the ASF ECS DAAC provides users with staging status of the 'request for retrieval' of the requested data products.

The Demonstration and Test methods are used to show that users at the ASF ECS DAAC sends requests for NOAA ADC data to the ASF DAAC Unique facility. At the completion of the test (and during), the requesting user receives status information and the requested data.

10.4.3.3 Test Case B100430.030 - Return of Requested NOAA ADC Data from ASF to ECS

The following test case verifies that the ECS user who requested the NOAA ADC data from the ASF DAAC have received that data. The Test method is used to verify that if the requested data products already exist, it can be browsed, retrieved, and then passed to the requesting user. The Test method is also used to verify that if the desired product requires lower level products to be used during processing and they already exist, they can be used to produce the requested product. At the completion of the test the ECS user who has requested the NOAA ADC Data receives the requested data.

10.4.3.4 Test Case B100430.040-Distribute Medium

The Distribute Medium test case verifies the capability of ECS users to distribute requests for products and data from the ASF ECS DAAC to other ECS users. The Test and Demonstration methods are used to show that ECS can distribute Low Resolution Products and Data from the ASF ECS DAAC, verify that ECS users prepare, for output to other ECS users, product orders to retrieve specified data from the archive and distribute it. The Test and Demonstration methods also verify that users at the ASF ECS DAAC accept requests to distribute data archived at the ASF ECS DAAC to requesting users, distributes that data in approved standard formats including HDF, sends distribution status to the user requesting the data (in response to

distribution status requests from the user), and automatically sends data distribution status to the user upon completion of the distribution process.

The Demonstration method verifies that users may distribute any data, to including any granule, stored in the archive in response to receipt of a product order from other ECS users. Also, the Demonstration method verifies the ASF ECS DAAC distributes data under a multi-level priority system, and the ability of the ASF ECS DAAC operator to conduct a manual override in order to alter the priority of a distribution request.

The Demonstration method verifies that it is possible for the ASF ECS DAAC to transfer products and subsetted, subsampled, or summary data to the requester, distribute data based upon entries in the order distribution lists, provides the capability of distributing information on-line (i.e., over a network), off-line (hard copy or off-line data media), electronically using a variety of approved high density storage media (such as: 8 mm tape, 4 mm DAT, 3480/3490 tape, CD ROM, and 6250 tape), and via networks and FAX.

Finally, the Demonstration method verifies that the Data Management Subsystem provides the capability for users to generate and update requests for orders from the ASF ECS DAAC, to distribute ASF ECS DAAC archive holdings and determine the amount of data expected to be returned as the result of the product order and provide the information to the requester.

At the completion of the test, the ECS user is able to prepare product orders to retrieve specified data (to include any granule in the archive) from the archive, distribute that data under a multi-level priority system in approved formats via networks, FAX, on-line, off-line, in approved storage media, receive distribution and completion status from the ASF ECS DAAC, and conduct a manual override of the distribution request to change the status.

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